

UniFirst Corporation

**Preliminary 2010/2011 Indoor
Air Risk Assessment for the
UniFirst Building**

**15 Olympia Avenue
Woburn, Massachusetts**

April 2011



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Air Risk Assessment for the
UniFirst Building**

15 Olympia Avenue
Woburn, Massachusetts

A handwritten signature in black ink that reads "Brian Magee".

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Our Ref.:
MA000989.0002

Date:
April 2011

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1. Introduction

ARCADIS U.S., Inc. (ARCADIS) has prepared a human health risk assessment based upon validated indoor air data collected in April 2010 and February 2011 from the UniFirst building located at 15 Olympia Avenue, Woburn, Massachusetts (the Property). The April 2010 data was presented in Table 3 of the Indoor Air Quality and Vapor Intrusion Assessment: Report of Results prepared by the Johnson Company (JCO) (2010a). Analytical results from February 2011 are presented in Table 1 of the Indoor Air Quality and Vapor Intrusion Assessment: Report of February 2011 Sampling Results (ARCADIS 2011). The list of compounds of potential concern (COPCs) is in accordance with Table 1 of the Indoor Air Quality and Vapor Intrusion Assessment Scope of Work submitted to the U.S. Environmental Protection Agency (USEPA) by JCO on behalf of the UniFirst Corporation in March 2010 (JCO 2010b). All COPCs that were detected in an indoor air sample from either data set were considered in the risk assessment.

This report presents the risk assessment results of both data sets (2010 and 2011) averaged to represent the overall long term average conditions in the on-Property building, also referred to as the warehouse in this report. Data were also temporally averaged on a point by point basis.

2. Comparison to Acute Exposure Criteria

To screen for potential near-term human health hazards, indoor air data were compared to two sets of acute exposure criteria, including Acute Minimal Risk Levels (MRLs) and Acute Exposure Guideline Levels (AEGLs) (<http://www.epa.gov/opptintr/aegl/index.htm>) (Table 1). In addition, indoor air data were compared to Occupational Safety and Health Administration (OSHA) criteria, including Permissible Exposure Limits (PELs) (http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9992) and Threshold Limit Values (TLVs®) (American Conference of Governmental Industrial Hygienists [ACGIH] 2010) (Table 1). Acute inhalation MRLs are derived by the Agency for Toxic Substances and Disease Registry (ATSDR) (<http://www.atsdr.cdc.gov/mrls/index.asp>) for noncarcinogenic effects from exposures lasting 14 days or less. AEGLs are set by USEPA for infrequent or one-time exposures to airborne compounds. An eight-hour AEGL-1 represents a concentration above which it is expected that the general population could experience significant but reversible irritation or discomfort. PELs are federal standards enforceable by the OSHA for an eight-hour time-weighted average occupational exposure. TLVs® are eight-hour time-weighted averages proposed by the ACGIH for occupational hazard assessment.

If no acute exposure criteria or occupational criteria were available for a given compound, surrogate values were used where appropriate (Table 1). Comparisons were based on individual samples without averaging of field duplicates (i.e., assuming that an individual person would consistently remain at the sample location throughout the relevant exposure period).

No result exceeded acute exposure criteria. Thus, acute indoor air exposures to the COPCs would not pose significant risks of harm to human health.

3. Exposure Assumptions

Risks from inhalation of volatile organic compounds (VOCs) in indoor air were estimated for a current commercial/industrial worker and a current storage unit user for both long- and short-term exposures and for a hypothetical future resident for long-term exposures. Exposure assumptions were based on current USEPA guidance (USEPA 2009) and discussions with project staff knowledgeable of building use patterns (Table 2). In accordance with USEPA guidance, long-term exposure was defined as 25 years for a commercial/industrial worker or storage user and 30 years for a hypothetical future resident. The short-term exposure was performed for a five-year exposure in accordance with the Massachusetts Department of Environmental Protection (MADEP) guidance for Imminent Hazard (IH) evaluations to determine if an IH condition existed as defined in the Massachusetts Contingency Plan (MCP) (MADEP 2008). As specified in the MCP, the IH evaluation was performed for current use receptors: current commercial/industrial workers and current storage unit users.

Each individual sampling location was considered an exposure area. In addition, exposure areas were identified for, the west warehouse (average of locations IA-01, IA-02, IA-03, and IA-09), the east warehouse (average of locations IA-04, IA-05, IA-06, IA-07, IA-08, IA-10, IA-11, IA-12, IA-13, and IA-14), and the entire warehouse (locations for both west and east warehouse, as well as location IA-15 in the pump room).

Sample locations are presented in Figure 1. A current receptor was assumed to be present in the warehouse areas for three hours/day as a storage unit user; in the office or warehouse for eight hours/day as a commercial/industrial worker; in the pump room for four hours/week as a commercial/industrial worker; and in the bathroom for one hour/day as a commercial/industrial worker or storage unit user. Hypothetical future residents were assumed to be present 24 hours/day in any area of the building.

Risks were estimated according to USEPA guidance (USEPA 2009) and the MCP (MADEP 2008). VOCs in indoor air were not considered to pose significant cumulative risk to human health within or below the USEPA Superfund target excess lifetime

cancer risk range of 1×10^{-6} to 1×10^{-4} for potential carcinogenic effects and a target hazard index (HI) of 1 for potential noncarcinogenic effects. The criteria applicable to the MADEP IH evaluation are a target excess lifetime cancer risk of 1×10^{-5} for potential carcinogenic effects and a target HI of 1 for potential noncarcinogenic effects.

The risk assessment was executed on all constituents that were detected in at least one indoor air sample, including several constituents that have been demonstrated *not* to be site-related, such as naphthalene and 1,4-dichlorobenzene. These constituents are present as a result of sources within the building as discussed in the Indoor Air Quality and Vapor Intrusion Assessment: Report of February 2011 Sampling Results (ARCADIS 2011) and are not within the scope of a release to the environment addressed under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

4. Results

Risks from exposure to indoor air via the inhalation pathway were evaluated considering a number of exposure scenarios; current commercial/industrial workers both short and long term, current storage users both short and long term, and a hypothetical future resident over a long term. Risks were calculated from a data set consisting of indoor air results from both 2010 and 2011 samples collected from the same locations in the on-Property building. Values were averaged for each sample location from each time period to generate exposure point concentrations for each location (Table 3). Sample locations were common for both the 2010 and 2011 sampling events, and are presented on Figure 1. Risk calculations for each individual sample location are included in Attachment A.

4.1 Current Commercial/Industrial Worker Scenario (Short-Term)

Cumulative estimated lifetime cancer risks for a short-term (five-year) exposure period for a current commercial/industrial worker exposed to the COPCs in indoor air in the warehouse, office, bathroom, and pump room did not exceed the MADEP IH target risk level of 1×10^{-5} (Table 4).

Cumulative estimated non-cancer risks for a short-term (five-year) exposure period to a current commercial/industrial worker exposed to the COPCs in indoor air in the warehouse, office, bathroom and pump room did not exceed the target HI of 1 (Table 4).

No IH condition as defined by the MCP was found to exist at 15 Olympia Avenue, Woburn, Massachusetts for the short-term worker exposure scenario. This same conclusion was reached independently for the April 2010 and the February 2011 data when each data set was assessed separately.

4.2 Current Commercial/Industrial Worker Scenario (Long-Term)

Cumulative estimated lifetime cancer risks for a long-term (25-year) exposure period to a current commercial/industrial worker exposed to the COPCs in indoor air were within the Superfund target excess lifetime cancer risk range of 1×10^{-6} to 1×10^{-4} and no samples exceeded 1×10^{-4} (Table 5).

Cumulative estimated non-cancer risks for a long-term (25-year) exposure period to a current commercial/industrial worker exposed to the COPCs in indoor air in the warehouse, office, bathroom and pump room did not exceed the target HI of 1 (Table 5). This same conclusion was reached independently for the April 2010 and the February 2011 data when each data set was assessed separately.

4.3 Current Storage Unit User Scenario (Short-Term)

Cumulative estimated lifetime cancer risks for a short-term (five-year) exposure period to a current storage unit user exposed to the COPCs in indoor air in the warehouse and bathroom did not exceed the MADEP target 1×10^{-5} risk level (Table 6).

Cumulative estimated non-cancer risks for a short-term (five-year) exposure period to a current storage unit user exposed to the COPCs in indoor air in the warehouse and bathroom did not exceed the target HI of 1 (Table 6). No IH condition as defined by the MCP was found to exist at 15 Olympia Avenue, Woburn, Massachusetts for the short-term storage unit user exposure scenario. This same conclusion was reached independently for the April 2010 and the February 2011 data when each data set was assessed separately.

4.4 Current Storage Unit User Scenario (Long-Term)

Cumulative estimated cancer risks for a long-term (25-year) exposure period to a current storage unit user exposed to the COPCs in indoor air were within the Superfund target excess lifetime cancer risk range of 1×10^{-6} to 1×10^{-4} and no samples exceeded 1×10^{-4} (Table 7).

Cumulative estimated non-cancer risks for a long-term (25-year) exposure period to a current storage unit user exposed to the COPCs in indoor air in the warehouse and bathroom did not exceed the target HI of 1 (Table 7). This same conclusion was reached independently for the April 2010 and the February 2011 data when each data set was assessed separately.

4.5 Hypothetical Future Resident Scenario (Long-Term)

Cumulative estimated lifetime cancer risks for a long-term (30-year) exposure period to a hypothetical future resident exposed to the COPCs in indoor air exceeded the Superfund target excess lifetime cancer risk range of 1×10^{-6} to 1×10^{-4} at locations 6, 12, and 13 (Table 8). All samples locations are presented on Figure 1. When the 2010 data were assessed separately, the locations that exceeded the USEPA's Superfund target risk range were: IA-01, IA-02, IA-04, IA-10, IA-12, and IA-13 (Figure 1). Risks from 2010 were presented in the Preliminary Risk Assessment Report (ARCADIS 2010). When the 2011 data were assessed separately, the locations that exceeded the USEPA's Superfund target risk range were: IA-6, IA-11, IA-12, and IA-13 (Figure 1).

Cumulative estimated non-cancer risks for a long-term (30-year) exposure period to a hypothetical future resident exposed to the COPCs in indoor air in the warehouse, office and bathroom exceeded the target HI of 1 at location IA-13 (Table 8 and Figure 1). When the 2010 data were assessed separately, the locations that exceeded the USEPA's noncarcinogenic target HI of 1 were: IA-1 through IA-4, IA-6 through IA-8, IA-10, and IA-12 through IA-14, the east warehouse, and the entire warehouse (Figure 1). When the 2011 data were assessed separately, no locations exceeded the USEPA's noncarcinogenic target HI of 1.

5. Conclusions and Recommendations

No indoor air sample exceeded acute exposure criteria or occupational criteria, and acute indoor air exposures to the COPCs are not estimated to pose significant risks to human health.

Cumulative estimated carcinogenic and noncarcinogenic risks for current commercial/industrial workers and storage unit users did not exceed target risk levels for a short-term (five-year) exposure period. No IH condition as defined by the MCP was found to exist at 15 Olympia Avenue, Woburn, Massachusetts.

Furthermore, estimated excess lifetime carcinogenic risks for these current land use receptors for a long-term (25-year) exposure period are within the Superfund target

excess lifetime cancer risk range of 1×10^{-6} to 1×10^{-4} at all locations and do not exceed 1×10^{-4} at any locations. In 11 locations, the excess lifetime cancer risks to commercial/industrial workers exceeded the midpoint of the Superfund risk range (1×10^{-5}), assuming that a receptor would consistently remain at one location over the entire 25-year term.

Cumulative carcinogenic and noncarcinogenic risks for hypothetical future residents for a long-term (30-year) exposure period exceeded the Superfund target excess lifetime cancer risk range of 1×10^{-6} to 1×10^{-4} in three specific exposure areas – locations 6, 12, and 13 (Figure 1). The average data for the east warehouse, the west warehouse, and the entire warehouse did not exceed the Superfund target excess lifetime cancer risk range. Despite the fact that it is not reasonably anticipated that this building might be used for residential purposes in the future, the hypothetical future residential use scenario is reported here for completeness. When the 2010 data were assessed separately, six areas exceeded the risk range; when the 2011 data were assessed separately, only three areas exceeded the risk range.

Estimated excess lifetime cancer risks are posed by several volatile constituents, including tetrachloroethylene (PCE), naphthalene (a constituent in moth repellents and fuels), and 1,4-dichlorobenzene (a constituent in moth repellents, cleaning products and bathroom deodorizers). Considering building wide risks as shown by the average of all samples, PCE makes up approximately half of the risk while other VOCs make up the other half. For instance, the cumulative estimated excess lifetime cancer risk for selected samples is posed by the following constituents (Figure 1):

Location IA-06: 71% PCE, 18% naphthalene

Location IA-12: 70% PCE, 19% naphthalene

Location IA-13: 59% PCE, 34% naphthalene

Average of all samples: 51% PCE, 22% naphthalene, 19% 1,4-dichlorobenzene

Detected concentrations of naphthalene from both 2010 and 2011 ranged from 0.3 to 16 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) in indoor air samples collected at the Property. Naphthalene was detected in all indoor air samples collected in 2010, and in 12 of 15 indoor air samples collected in 2011. In sub-slab soil vapor samples naphthalene was not detected in 2010 samples, and naphthalene was only detected in 1 of 15 samples collected in 2011. Naphthalene was detected in sub-slab soil vapor sample at an estimated concentration of 0.571 $\mu\text{g}/\text{m}^3$. Typical reported naphthalene

levels in indoor air across the United States have been recently reviewed by Magee, et al. (2010). Typical indoor air levels associated with moth repellent use range from 530 to 1,200 ug/m³. Thus, levels of 0.3-16 ug/m³ are not uncommon in locations such as storage units, where moth repellents are in use. Because naphthalene is not found in the majority of sub-slab soil vapor samples and because the levels found in indoor air samples from the on-Property building are consistent with typical air levels associated with moth repellent use, naphthalene detections in indoor air are not from a sub-slab source and are therefore not site-related. Although it was included in the estimation of risks, it should not be considered a COPC for this site.

Detected concentrations of 1,4-dichlorobenzene ranged from 0.3 to 40 ug/m³ in indoor air samples collected at the Property. 1,4-Dichlorobenzene was detected in all indoor air samples collected in 2010, and in 14 of 15 samples collected in 2011. 1,4-Dichlorobenzene was not detected frequently in sub-slab soil vapor samples, being detected in just four samples collected in 2010 and in no samples collected in 2011. Detected concentrations of 1,4-dichlorobenzene in sub-slab soil vapor samples from 2010 ranged from 0.19 to 12 ug/m³; below concentrations detected in indoor air samples. According to the ATSDR (2006), typical levels of 1,4-dichlorobenzene in bathrooms with deodorizers range from 470 to 1,300 ug/m³. In buildings using solid deodorizers, median and maximum 1,4-dichlorobenzene levels were reported as 340 and 630 ug/m³. In enclosed spaces where 1,4-dichlorobenzene moth repellents were in use, levels of 1,4-dichlorobenzene ranging from 1,300 to 3,300 ug/m³ were measured. USEPA also measured 1,4-dichlorobenzene in the bedroom closet of a test house containing moth repellents used as specified by the manufacturer's recommended usage (Tichenor et al. 1990). Average 1,4-dichlorobenzene concentrations in the closet, bedroom, second bedroom and den of the test house were 74,000, 5,100, 3,900 and 3,700 ug/m³, respectively. Thus, levels of <1 to 40 ug/m³ are not uncommon in locations such as storage sheds and commercial buildings, where moth repellents, cleaning products and room deodorizers are in use. Because 1,4-dichlorobenzene is not found in sub-slab soil vapor at appreciable levels and because the levels found in the building are consistent with typical indoor air levels associated with the use of 1,4-dichlorobenzene-containing products, 1,4-dichlorobenzene detections in indoor air are not from a sub-slab source and are therefore not site-related. Although it was included in the estimation of risks, it should not be considered a COPC for this site.

When the entire risk assessment was executed for just PCE to determine its role in posing estimated cancer risks to receptors that might breathe PCE in indoor air, all samples were within the Superfund risk range of 1×10^{-6} to 1×10^{-4} , and none exceeded 1×10^{-4} for a long-term exposure period for current use receptors. Only a few individual samples posed risks exceeding the midpoint of the range (1×10^{-5}) for a long-term

exposure period for current use receptors. The west warehouse and the entire warehouse average samples did not exceed 1×10^{-5} estimated excess lifetime cancer risk. The east warehouse average samples did exceed 1×10^{-5} for PCE. The only exceedances of the midpoint of the Superfund risk range were for the long term worker at the locations noted below (Figure 1):

Location IA-06	2×10^{-5}
Location IA-11	2×10^{-5}
Location IA-12	2×10^{-5}
Location IA-13	3×10^{-5}
East Warehouse	2×10^{-5}

6. References

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Table 1. Acute and Occupational Exposure Criteria for COPCs Detected in Indoor Air

Compound	ATSDR MRL	USEPA A EGL	OSHA PEL	ACGIH TLV
1,1,1-Trichloroethane	1.09E+04	1.25E+06	1.90E+06	NA
1,1-Dichloroethane	NA	NA	4.00E+05	4.05E+05
1,1-Dichloroethene	NA	NA	NA	NA
1,2,4-Trimethylbenzene	NA	2.21E+05	NA	1.23E+05
1,2-Dichloroethane	NA	NA	2.02E+05	NA
1,3-Butadiene	2.21E+02	1.48E+06	2.21E+03	4.42E+03
1,4-Dichlorobenzene	1.20E+04	NA	2.71E+06	6.01E+04
Benzene	2.87E+01	2.87E+04	3.19E+04	1.60E+03
Carbon tetrachloride	NA	1.20E+05	6.30E+04	3.15E+04
Chloroform	4.87E+02	1.41E+05	2.40E+05	4.87E+04
cis-1,2-Dichloroethene	NA	5.55E+05	7.90E+05	7.93E+05
Ethylbenzene	4.34E+04	1.43E+05	4.35E+05	4.34E+05
Methyl tert-butyl ether	7.20E+03	1.80E+05	NA	1.80E+05
Methylene chloride	2.09E+03	2.09E+05	8.69E+04	1.74E+05
Naphthalene	NA	NA	5.00E+04	5.24E+04
Tetrachloroethene	1.36E+03	2.38E+05	6.79E+05	1.70E+05
Toluene	3.76E+03	7.53E+05	7.53E+05	7.53E+04
Trichloroethene	1.07E+04	4.13E+05	5.36E+05	5.36E+04
Xylenes	8.67E+03	5.64E+05	4.35E+05	4.34E+05

Notes:

All concentrations in ug/m³. Concentrations reported in parts per million (ppm) were first converted to mg/m³:
 (concentration in ppm)*(molecular weight)/24.45.

Abbreviations:

ACGIH TLV = American Conference of Governmental Industrial Hygienists Threshold Limit Value® (time-weighted average) (2010).

ATSDR MRL = Agency for Toxic Substances and Disease Registry Minimum Risk Level (acute inhalation exposure) (<http://www.atsdr.cdc.gov/mrls/index.asp>).

COPC = compound of potential concern.

NA = value not available.

OSHA PEL = Occupational Safety and Health Administration Permissible Exposure Limits (29 CFR 1910 Subpart Z) (http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=9992).

USEPA A EGL = U.S. Environmental Protection Agency Acute Exposure Guideline Level (8-hour A EGL 1; A EGL 2 if A EGL 1 not reported) (<http://www.epa.gov/opptintr/aegl/index.htm>).

Table 2. Exposure Assumptions for the Estimation of Risks from Inhalation of Volatile Constituents in Indoor Air
Hypothetical Future Resident

Parameter	Units	Hypothetical Future Resident – Long Term		
		Value	Source	Comment
Exposure Time	hours/day	24	(a)	
Exposure Frequency	days/year	350	(a)	
Exposure Duration	year	30	(a)	
Averaging Time – Cancer	hours	613200	(a)	
Averaging Time – Non-Cancer	hours	262800	(a)	

Commercial/Industrial Worker (Warehouse, Office)

Parameter	Units	Commercial/ Industrial Worker – Long Term			Commercial/ Industrial Worker – Short Term		
		Value	Source	Comment	Value	Source	Comment
Exposure Time	hours/day	8	(a)	5 days/week, 50 weeks/year	8	(a)	5 days/week, 50 weeks/year
Exposure Frequency	days/year	250	(a)	5 days/week, 50 weeks/year	250	(a)	5 days/week, 50 weeks/year
Exposure Duration	year	25	(a)		5	(b)	MADEP IH
Averaging Time – Cancer	hours	613200	(a)		613200	(a)	
Averaging Time – Non Cancer	hours	219000	(a)		43800	(a)	

Commercial/Industrial Worker or Storage Unit User (Bathroom)

Parameter	Units	Commercial/ Industrial Worker or Storage User – Long Term – Bathroom			Commercial/ Industrial Worker or Storage User – Short Term – Bathroom		
		Value	Source	Comment	Value	Source	Comment
Exposure Time	hours/d	1		professional judgment	1		professional judgment
Exposure Frequency	days/year	250	(a)	5 days/week, 50 weeks/year	250	(a)	5 days/week, 50 weeks/year
Exposure Duration	year	25	(a)		5	(b)	MADEP IH
Averaging Time – Cancer	hours	613200	(a)		6132000	(a)	
Averaging Time – Non-Cancer	hours	219000	(a)		43800	(a)	

Commercial/Industrial Worker (Pump Room)

Parameter	Units	Commercial/ Industrial Worker – Long Term – Pump Room			Commercial/ Industrial Worker - Short Term - Pump Room		
		Value	Source	Comment	Value	Source	Comment
Exposure Time	hours/day	0.57		4 hours/week	0.57		4 hours/week
Exposure Frequency	days/year	250	(a)	5 days/week, 50 weeks/year	250	(a)	5 days/week, 50 weeks/year
Exposure Duration	year	25	(a)		5	(b)	MADEP IH
Averaging Time – Cancer	hours	613200	(a)		613200	(a)	
Averaging Time – Non-Cancer	hours	219000	(a)		43800	(a)	

Table 2. Exposure Assumptions for the Estimation of Risks from Inhalation of Volatile Constituents in Indoor Air

Parameter	Units	Storage Unit User (Warehouse)			Storage Unit User – Short Term – Warehouse		
		Value	Source	Comment	Value	Source	Comment
Exposure Time	hours/day	3		professional judgment	3		professional judgment
Exposure Frequency	days/year	250	(a)	5 days/week, 50 weeks/year	250	(a)	5 days/week, 50 weeks/year
Exposure Duration	year	25	(a)		5	(b)	MADEP IH
Averaging Time – Cancer	hours	6132000	(a)		613200	(a)	
Averaging Time – Non-Cancer	hours	219000	(a)		43800	(a)	

Notes:

(a) U.S. Environmental Protection Agency (2009)

(b) MADEP IH Exposure Period

Abbreviation:

MADEP IH = Massachusetts Department of Environmental Protection guidance for Imminent Hazard.

Table 3. EPC values for 2010, 2011, and Averaged Indoor Air Sampling Events at 15 Olympia Avenue, Woburn, Massachusetts

Compound	CAS No.	Location: Date:	IA-01 2010 mg/m ³	IA-01 2011 mg/m ³	IA-01 Average mg/m ³	IA-02 2010 mg/m ³	IA-02 2011 mg/m ³	IA-02 Average mg/m ³	IA-03 2010 mg/m ³	IA-03 2011 mg/m ³	IA-03 Average mg/m ³	IA-04 2010 mg/m ³
1,1,1-Trichloroethane	71-55-6		0.000251	0.0000545	0.00015275	0.0003	0.0000545	0.00017725	0.000294	0.0000545	0.00017425	0.000294
1,1-Dichloroethane	75-34-3			0.0000405	0.0000405	0.0000405	0.0000405	0.0000405	0.0000405	0.0000405	0.0000405	0.0000405
1,1-Dichloroethene	75-35-4			0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395
1,2,4-Trimethylbenzene	95-63-6		0.00122	0.000368	0.000794	0.00112	0.000304	0.000712	0.00113	0.000373	0.0007515	0.0016
1,2-Dichloroethane	107-06-2		0.000554	0.000222	0.000388	0.000607	0.00021	0.0004085	0.000651	0.00023	0.0004405	0.000833
1,3-Butadiene	106-99-0		0.000022	0.000046	0.000034	0.000053	0.000022	0.0000375	0.000044	0.000044	0.000044	0.000046
1,4-Dichlorobenzene	106-46-7		0.036	0.00198	0.01899	0.0401	0.00183	0.020965	0.0158	0.00211	0.008955	0.0116
Benzene	71-43-2		0.000728	0.000584	0.000656	0.0009	0.000594	0.000747	0.000862	0.000603	0.0007325	0.000903
Carbon tetrachloride	56-23-5		0.000459	0.000471	0.000465	0.000484	0.00049	0.000487	0.000408	0.00049	0.000449	0.000421
Chloroform	67-66-3		0.000215	0.000049	0.000132	0.000263	0.000049	0.000156	0.000176	0.000049	0.0001125	0.000161
cis-1,2-Dichloroethene	156-59-2		0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395
Ethylbenzene	100-41-4		0.000859	0.000295	0.000577	0.000859	0.000273	0.000566	0.000889	0.000321	0.000605	0.00114
Methylene chloride	75-09-2		0.0036	0.00187	0.002735	0.00368	0.00184	0.00276	0.00272	0.00206	0.00239	0.00248
Methyl tert butyl ether	1634-04-4		0.000396	0.000036	0.000216	0.00045	0.000036	0.000243	0.000443	0.000036	0.0002395	0.000439
Naphthalene	91-20-3		0.0023	0.000712	0.001506	0.00219	0.00066	0.001425	0.0021	0.000587	0.0013435	0.00418
Xylenes	1330-20-7		0.00299	0.00109	0.00204	0.00297	0.000942	0.001956	0.00322	0.00112	0.00217	0.00432
Tetrachloroethene	127-18-4		0.004436	0.00228	0.00332	0.00434	0.0021	0.00322	0.00875	0.00253	0.00564	0.0191
Toluene	108-88-3		0.00586	0.00185	0.003855	0.00618	0.00172	0.00395	0.00877	0.00215	0.00546	0.0196
Trichloroethene	79-01-6		0.0000535	0.0000535	0.0000535	0.0000535	0.0000535	0.0000535	0.000113	0.0000535	0.00008325	0.000161

Notes:

Bolded values were undetected, 1/2 detection limit is given

Bold and italicized values indicate estimated values

CAS = Chemical Abstracts Service

EPC = exposure point concentration

mg/m³ = milligrams per cubic meter

Table 3. EPC values for 2010, 2011, and Averaged Indoor Air Sampling Events at 15 Olympia Avenue, Woburn, Massachusetts

Compound	CAS No.	Location: Date:	IA-04 2011 mg/m ³	IA-04 Average mg/m ³	IA-05 2010 mg/m ³	IA-05 2011 mg/m ³	IA-05 Average mg/m ³	IA-06 2010 mg/m ³	IA-06 2011 mg/m ³	IA-06 Average mg/m ³	IA-07 2010 mg/m ³	IA-07 2011 mg/m ³	IA-07 Average mg/m ³	
1,1,1-Trichloroethane	71-55-6		0.000305	0.0002995	0.000218	0.000245	0.0002315	0.000425	0.000523	0.000474	0.000491	0.000229	0.00036	
1,1-Dichloroethane	75-34-3		0.0000405	0.0000405	0.0000405	0.0000405	0.0000405	0.0000405	0.0000405	0.0000405	0.0000405	0.0000405	0.0000405	
1,1-Dichloroethene	75-35-4		0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	
1,2,4-Trimethylbenzene	95-63-6		0.000388	0.000994	0.00102	0.000275	0.0006475	0.00104	0.000368	0.000704	0.000958	0.000363	0.0006605	
1,2-Dichloroethane	107-06-2		0.000283	0.000558	0.000356	0.000206	0.000281	0.000562	0.000267	0.0004145	0.000663	0.000243	0.000453	
1,3-Butadiene	106-99-0		0.000022	0.000034	0.000097	0.000046	0.0000715	0.000066	0.000022	0.000044	0.000062	0.000046	0.000054	
1,4-Dichlorobenzene	106-46-7		0.0013	0.00645	0.00143	0.000661	0.0010455	0.00235	0.000739	0.0015445	0.00375	0.00151	0.00263	
Benzene	71-43-2		0.000626	0.0007645	0.00114	0.000587	0.0008635	0.00118	0.000632	0.000906	0.000993	0.000619	0.000806	
Carbon tetrachloride	56-23-5		0.000484	0.0004525	0.000402	0.000471	0.0004365	0.000453	0.000478	0.0004655	0.000421	0.000497	0.000459	
Chloroform	67-66-3		0.000098	0.0001295	0.000151	0.000049	0.0001	0.000161	0.000049	0.000105	0.000151	0.000049	0.0001	
cis-1,2-Dichloroethene	156-59-2		0.000099	0.00006925	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.000107	7.325E-05	0.000111	0.0000395	0.00007525
Ethylbenzene	100-41-4		0.000369	0.0007545	0.00101	0.000282	0.000646	0.000811	0.000347	0.000579	0.00082	0.000351	0.0005855	
Methylene chloride	75-09-2		0.00087	0.001675	0.00087	0.00087	0.00087	0.00087	0.00087	0.00087	0.00174	0.00087	0.001305	
Methyl tert butyl ether	1634-04-4		0.000036	0.0002375	0.000166	0.000036	0.000101	0.000148	0.000036	0.000092	0.000198	0.000036	0.000117	
Naphthalene	91-20-3		0.000948	0.002564	0.00117	0.000097	0.0006335	0.00349	0.000901	0.0021955	0.0043	0.000649	0.0024745	
Xylenes	1330-20-7		0.00127	0.002795	0.00402	0.000985	0.0025025	0.00309	0.00114	0.002115	0.00306	0.0012	0.00213	
Tetrachloroethene	127-18-4		0.0232	0.02115	0.00983	0.0231	0.016465	0.0369	0.061	0.04895	0.0299	0.0156	0.02275	
Toluene	108-88-3		0.00208	0.01084	0.00756	0.00141	0.004485	0.00902	0.00188	0.00545	0.0107	0.00199	0.006345	
Trichloroethene	79-01-6		0.000113	0.000137	0.000118	0.0000535	0.00008575	0.000231	0.000161	0.000196	0.000322	0.0000535	0.00018775	

Notes:

Bolded values were undetected, 1/2 detection limit is given

Bold and italicized values indicate estimated values

CAS = Chemical Abstracts Service

EPC = exposure point concentration

mg/m³ = milligrams per cubic meter

Table 3. EPC values for 2010, 2011, and Averaged Indoor Air Sampling Events at 15 Olympia Avenue, Woburn, Massachusetts

Compound	CAS No.	Location: Date:	IA-08 2010 mg/m ³	IA-08 2011 mg/m ³	IA-08 Average mg/m ³	IA-09 2010 mg/m ³	IA-09 2011 mg/m ³	IA-09 Average mg/m ³	IA-10 2010 mg/m ³	IA-10A 2010 mg/m ³	IA-10 2011 mg/m ³	IA-10 Average mg/m ³
1,1,1-Trichloroethane	71-55-6		0.000229	0.000213	0.000221	0.000142	0.0000545	0.00009825	0.000371	0.000382	0.000714	0.00054525
1,1-Dichloroethane	75-34-3		0.0000405	0.0000405	0.0000405	0.0000405	0.0000405	0.0000405	0.0000405	0.0000405	0.000202	0.00012125
1,1-Dichloroethene	75-35-4		0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395
1,2,4-Trimethylbenzene	95-63-6		0.00119	0.000373	0.0007815	0.000413	0.000138	0.0002755	0.0011	0.00133	0.000393	0.000804
1,2-Dichloroethane	107-06-2		0.000481	0.000202	0.0003415	0.000243	0.0000405	0.00014175	0.000833	0.000874	0.000283	0.00056825
1,3-Butadiene	106-99-0		0.000055	0.000022	0.0000385	0.00011	0.000022	0.000066	0.000022	0.000022	0.000051	0.0000365
1,4-Dichlorobenzene	106-46-7		0.00411	0.000589	0.0023495	0.000378	0.00006	0.000219	0.000608	0.00672	0.000955	0.0036775
Benzene	71-43-2		0.00111	0.000648	0.000879	0.00143	0.000517	0.0009735	0.000862	0.000906	0.000629	0.0007565
Carbon tetrachloride	56-23-5		0.00049	0.000478	0.000484	0.000415	0.000478	0.0004465	0.00044	0.000415	0.00049	0.00045875
Chloroform	67-66-3		0.00022	0.000049	0.0001345	0.000195	0.000049	0.000122	0.000141	0.000146	0.000127	0.00013525
cis-1,2-Dichloroethene	156-59-2		0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.000095	0.000103	0.000313	0.000206
Ethylbenzene	100-41-4		0.00153	0.000334	0.000932	0.00108	0.00013	0.000605	0.000803	0.00095	0.00039	0.00063325
Methylene chloride	75-09-2		0.00087	0.00087	0.00087	0.00087	0.00087	0.00087	0.00382	0.00174	0.00087	0.001825
Methyl tert butyl ether	1634-04-4		0.000263	0.000036	0.0001495	0.00102	0.000036	0.000528	0.000248	0.000266	0.000036	0.0001465
Naphthalene	91-20-3		0.00193	0.000466	0.001198	0.00013	0.000131	0.0001305	0.0043	0.00591	0.00113	0.0031175
Xylenes	1330-20-7		0.00537	0.00118	0.003275	0.00364	0.000421	0.0020305	0.00297	0.00352	0.00143	0.0023375
Tetrachloroethene	127-18-4		0.0153	0.0183	0.0168	0.00436	0.000861	0.0026105	0.028	0.0335	0.0313	0.031025
Toluene	108-88-3		0.00975	0.00176	0.005755	0.00846	0.000618	0.004539	0.0119	0.0129	0.00192	0.00716
Trichloroethene	79-01-6		0.00014	0.0000535	0.00009675	0.000113	0.0000535	0.00008325	0.00022	0.000231	0.000188	0.00020675

Notes:

Bolded values were undetected, 1/2 detection limit is given

Bold and italicized values indicate estimated values

CAS = Chemical Abstracts Service

EPC = exposure point concentration

mg/m³ = milligrams per cubic meter

Table 3. EPC values for 2010, 2011, and Averaged Indoor Air Sampling Events at 15 Olympia Avenue, Woburn, Massachusetts

Compound	CAS No.	Location: Date:	IA-11 2010 mg/m³	IA-11 2011 mg/m³	IA-11 Average mg/m³	IA-12 2010 mg/m³	IA-12 2011 mg/m³	IA-12 Average mg/m³	IA-13 2010 mg/m³	IA-13A 2010 mg/m³	IA-13 2011 mg/m³	IA-13 Average mg/m³
1,1,1-Trichloroethane	71-55-6		0.0007685	0.000657	0.00071275	0.000469	0.000491	0.00048	0.0006595	0.000714	0.0007385	0.000712625
1,1-Dichloroethane	75-34-3		0.0000405	0.000107	0.00007375	0.0000405	0.0000405	0.0000405	0.000087	0.000089	0.000194	0.000141
1,1-Dichloroethene	75-35-4		0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395	0.0000395
1,2,4-Trimethylbenzene	95-63-6		0.000393	0.0001965	0.00029475	0.00122	0.000383	0.0008015	0.000469	0.000791	0.000427	0.0005285
1,2-Dichloroethane	107-06-2		0.0001355	0.000146	0.00014075	0.000542	0.000287	0.0004145	0.000382	0.000404	0.00033	0.0003615
1,3-Butadiene	106-99-0		0.000093	0.000022	0.0000575	0.000069	0.000055	0.000062	0.0000775	0.000071	0.000046	0.000060125
1,4-Dichlorobenzene	106-46-7		0.000294	0.000276	0.000285	0.00227	0.000769	0.0015195	0.000945	0.00183	0.000889	0.00113825
Benzene	71-43-2		0.0008075	0.000538	0.00067275	0.00106	0.000658	0.000859	0.000755	0.000785	0.0006605	0.00071525
Carbon tetrachloride	56-23-5		0.00044	0.000484	0.000462	0.000434	0.000478	0.000456	0.0004115	0.000408	0.000487	0.000448375
Chloroform	67-66-3		0.0001435	0.000098	0.00012075	0.000156	0.000049	0.0001025	0.000129	0.000132	0.0001295	0.00013
cis-1,2-Dichloroethene	156-59-2		0.000158	0.000511	0.0003345	0.0000395	0.000103	0.00007125	0.000186	0.000198	0.000315	0.0002535
Ethylbenzene	100-41-4		0.0004385	0.000204	0.00032125	0.000833	0.000356	0.0005945	0.000488	0.00059	0.0004795	0.00050925
Methylene chloride	75-09-2		0.00087	0.00087	0.00087	0.00087	0.00087	0.00087	0.0044	0.00087	0.00087	0.0017525
Methyl tert butyl ether	1634-04-4		0.000036	0.000036	0.000036	0.00013	0.000036	0.000083	0.000083	0.000072	0.000036	0.00005675
Naphthalene	91-20-3		0.001101	0.000518	0.0008095	0.00373	0.00089	0.00231	0.0034985	0.0156	0.001935	0.005742125
Xylenes	1330-20-7		0.00159	0.000746	0.001168	0.00314	0.00124	0.00219	0.001735	0.00218	0.001645	0.00180125
Tetrachloroethene	127-18-4		0.0185	0.0812	0.04985	0.045	0.0533	0.04915	0.0459	0.0602	0.0603	0.056675
Toluene	108-88-3		0.00274	0.0009845	0.00186225	0.00798	0.00198	0.00498	0.004565	0.0048	0.00232	0.00350125
Trichloroethene	79-01-6		0.000513	0.00104	0.0007765	0.00022	0.000156	0.000188	0.000467	0.00051	0.000274	0.00038125

Notes:

Bolded values were undetected, 1/2 detection limit is given

Bold and italicized values indicate estimated values

CAS = Chemical Abstracts Service

EPC = exposure point concentration

mg/m³ = milligrams per cubic meter

Table 3. EPC values for 2010, 2011, and Averaged Indoor Air Sampling Events at 15 Olympia Avenue, Woburn, Massachusetts

Compound	CAS No.	Location: Date:	IA-14 2010 mg/m³	IA-14 2011 mg/m³	IA-14 Average mg/m³	IA-15 2010 mg/m³	IA-15 2011 mg/m³	IA-15 Average mg/m³
1,1,1-Trichloroethane	71-55-6		0.000218	0.000196	0.000207	0.00168	0.00269	0.002185
1,1-Dichloroethane	75-34-3		0.0000405	0.0000405	0.0000405	0.000671	0.000926	0.0007985
1,1-Dichloroethene	75-35-4		0.0000395	0.0000395	0.0000395	0.000131	0.000178	0.0001545
1,2,4-Trimethylbenzene	95-63-6		0.00141	0.000432	0.000921	0.000211	0.000246	0.0002285
1,2-Dichloroethane	107-06-2		0.00053	0.00021	0.00037	0.000093	0.000109	0.000101
1,3-Butadiene	106-99-0		0.000022	0.000046	0.000034	0.000046	0.000049	0.0000475
1,4-Dichlorobenzene	106-46-7		0.00422	0.000991	0.0026055	0.000312	0.000144	0.000228
Benzene	71-43-2		0.000938	0.000699	0.0008185	0.000664	0.000517	0.0005905
Carbon tetrachloride	56-23-5		0.00044	0.000509	0.0004745	0.000421	0.000478	0.0004495
Chloroform	67-66-3		0.000405	0.00019	0.0002975	0.000229	0.000293	0.000261
cis-1,2-Dichloroethene	156-59-2		0.0000395	0.0000395	0.0000395	0.00057	0.00135	0.00096
Ethylbenzene	100-41-4		0.00143	0.000364	0.000897	0.000968	0.00039	0.000679
Methylene chloride	75-09-2		0.00087	0.00194	0.001405	0.00087	0.00087	0.00087
Methyl tert butyl ether	1634-04-4		0.000252	0.000036	0.000144	0.000072	0.000036	0.000054
Naphthalene	91-20-3		0.00268	0.000665	0.0016725	0.000498	0.000134	0.000316
Xylenes	1330-20-7		0.00511	0.00128	0.003195	0.00333	0.0015	0.002415
Tetrachloroethene	127-18-4		0.0179	0.0165	0.0172	0.012	0.0399	0.02595
Toluene	108-88-3		0.00958	0.00198	0.00578	0.00474	0.00215	0.003445
Trichloroethene	79-01-6		0.000118	0.0000535	0.00008575	0.000226	0.000489	0.0003575

Notes:

Bolded values were undetected, 1/2 detection limit is given

Bold and italicized values indicate estimated values

CAS = Chemical Abstracts Service

EPC = exposure point concentration

mg/m³ = milligrams per cubic meter

Table 4. Summary of Estimated Indoor Air Risks for Short-Term Exposures (MADEP Imminent Hazard Evaluation) for Current Commercial/Industrial Workers

Exposure Area	Receptor	Total Cancer Risk	Total HI
IA-01	Commercial/Industrial Worker	5.E-06	0.2
IA-02	Commercial/Industrial Worker	5.E-06	0.2
IA-03	Commercial/Industrial Worker	3.E-06	0.2
IA-04	Commercial/Industrial Worker	5.E-06	0.3
IA-05	Commercial/Industrial Worker	3.E-06	0.1
IA-06	Commercial/Industrial Worker	7.E-06	0.3
IA-07	Commercial/Industrial Worker	4.E-06	0.2
IA-08 (Office)	Commercial/Industrial Worker	3.E-06	0.2
IA-09	Commercial/Industrial Worker	7.E-07	0.04
IA-10	Commercial/Industrial Worker	6.E-06	0.3
IA-11	Commercial/Industrial Worker	6.E-06	0.1
IA-12	Commercial/Industrial Worker	7.E-06	0.3
IA-13	Commercial/Industrial Worker	9.E-06	0.5
IA-14 (Bathroom)	Commercial/Industrial Worker	2.E-07	0.006
IA-15 (Pump Room)	Commercial/Industrial Worker	5.E-06	0.2
East Warehouse	Commercial/Industrial Worker	4.E-06	0.1
West Warehouse	Commercial/Industrial Worker	5.E-06	0.2
Entire Warehouse	Commercial/Industrial Worker	5.E-06	0.2

Note:

Bold values indicate cumulative cancer risk > 1×10^{-5} or cumulative HI > 1. No values in this table are bolded.

Abbreviations:

HI = hazard index.

MADEP = Massachusetts Department of Environmental Protection.

Table 5. Summary of Estimated Indoor Air Risks for Long-Term Exposures for Current Commercial/Industrial Workers

Exposure Area	Receptor	Total Cancer Risk	Total HI
IA-01	Commercial/Industrial Worker	2.E-05	0.2
IA-02	Commercial/Industrial Worker	3.E-05	0.2
IA-03	Commercial/Industrial Worker	2.E-05	0.2
IA-04	Commercial/Industrial Worker	3.E-05	0.3
IA-05	Commercial/Industrial Worker	1.E-05	0.1
IA-06	Commercial/Industrial Worker	3.E-05	0.3
IA-07	Commercial/Industrial Worker	2.E-05	0.2
IA-08 (Office)	Commercial/Industrial Worker	2.E-05	0.2
IA-09	Commercial/Industrial Worker	4.E-06	0.04
IA-10	Commercial/Industrial Worker	3.E-05	0.3
IA-11	Commercial/Industrial Worker	3.E-05	0.1
IA-12	Commercial/Industrial Worker	3.E-05	0.3
IA-13	Commercial/Industrial Worker	5.E-05	0.5
IA-14 (Bathroom)	Commercial/Industrial Worker	2.E-06	0.02
IA-15 (Pump Room)	Commercial/Industrial Worker	1.E-06	0.006
East Warehouse	Commercial/Industrial Worker	3.E-05	0.2
West Warehouse	Commercial/Industrial Worker	2.E-05	0.1
Entire Warehouse	Commercial/Industrial Worker	2.E-05	0.2

Note:

Bold values indicate cumulative cancer risk > 1×10^{-4} or cumulative HI > 1. No values in this table are bolded.

Abbreviation:

HI = hazard index.

Table 6. Summary of Estimated Indoor Air Risks for Short-Term Exposures (MADEP Imminent Hazard Evaluation) for Current Storage Unit Users

Exposure Area	Receptor	Total Cancer Risk	Total HI
IA-01	Storage Unit User	2.E-06	0.06
IA-02	Storage Unit User	2.E-06	0.06
IA-03	Storage Unit User	1.E-06	0.06
IA-04	Storage Unit User	2.E-06	0.1
IA-05	Storage Unit User	9.E-07	0.04
IA-06	Storage Unit User	2.E-06	0.09
IA-07	Storage Unit User	2.E-06	0.09
IA-09	Storage Unit User	3.E-07	0.02
IA-10	Storage Unit User	2.E-06	0.1
IA-11	Storage Unit User	2.E-06	0.05
IA-12	Storage Unit User	3.E-06	0.1
IA-13	Storage Unit User	3.E-06	0.2
IA-14 (Bathroom)	Storage Unit User	4.E-07	0.02
East Warehouse	Storage Unit User	2.E-06	0.09
West Warehouse	Storage Unit User	1.E-06	0.05
Entire Warehouse	Storage Unit User	2.E-06	0.08

Note:

Bold values indicate cumulative cancer risk > 1×10^{-5} or cumulative HI > 1. No values in this table are bolded.

Abbreviations:

HI = hazard index.

MADEP = Massachusetts Department of Environmental Protection.

Table 7. Summary of Estimated Indoor Air Risks for Long-Term Exposures for Current Storage Unit Users

Exposure Area	Receptor	Total Cancer Risk	Total HI
IA-01	Storage Unit User	9.E-06	0.06
IA-02	Storage Unit User	1.E-05	0.06
IA-03	Storage Unit User	6.E-06	0.06
IA-04	Storage Unit User	1.E-05	0.1
IA-05	Storage Unit User	5.E-06	0.04
IA-06	Storage Unit User	1.E-05	0.09
IA-07	Storage Unit User	8.E-06	0.09
IA-09	Storage Unit User	1.E-06	0.02
IA-10	Storage Unit User	1.E-05	0.1
IA-11	Storage Unit User	1.E-05	0.05
IA-12	Storage Unit User	1.E-05	0.1
IA-13	Storage Unit User	2.E-05	0.2
IA-14 (Bathroom)	Storage Unit User	2.E-06	0.02
East Warehouse	Storage Unit User	1.E-05	0.09
West Warehouse	Storage Unit User	7.E-06	0.05
Entire Warehouse	Storage Unit User	9.E-06	0.08

Note:

Bold values indicate cumulative cancer risk > 1×10^{-4} or cumulative HI > 1. No values in this table are bolded.

Abbreviation:

HI = hazard index.

Table 8. Summary of Estimated Indoor Air Risks for Long-Term Exposures for Hypothetical Future Residents

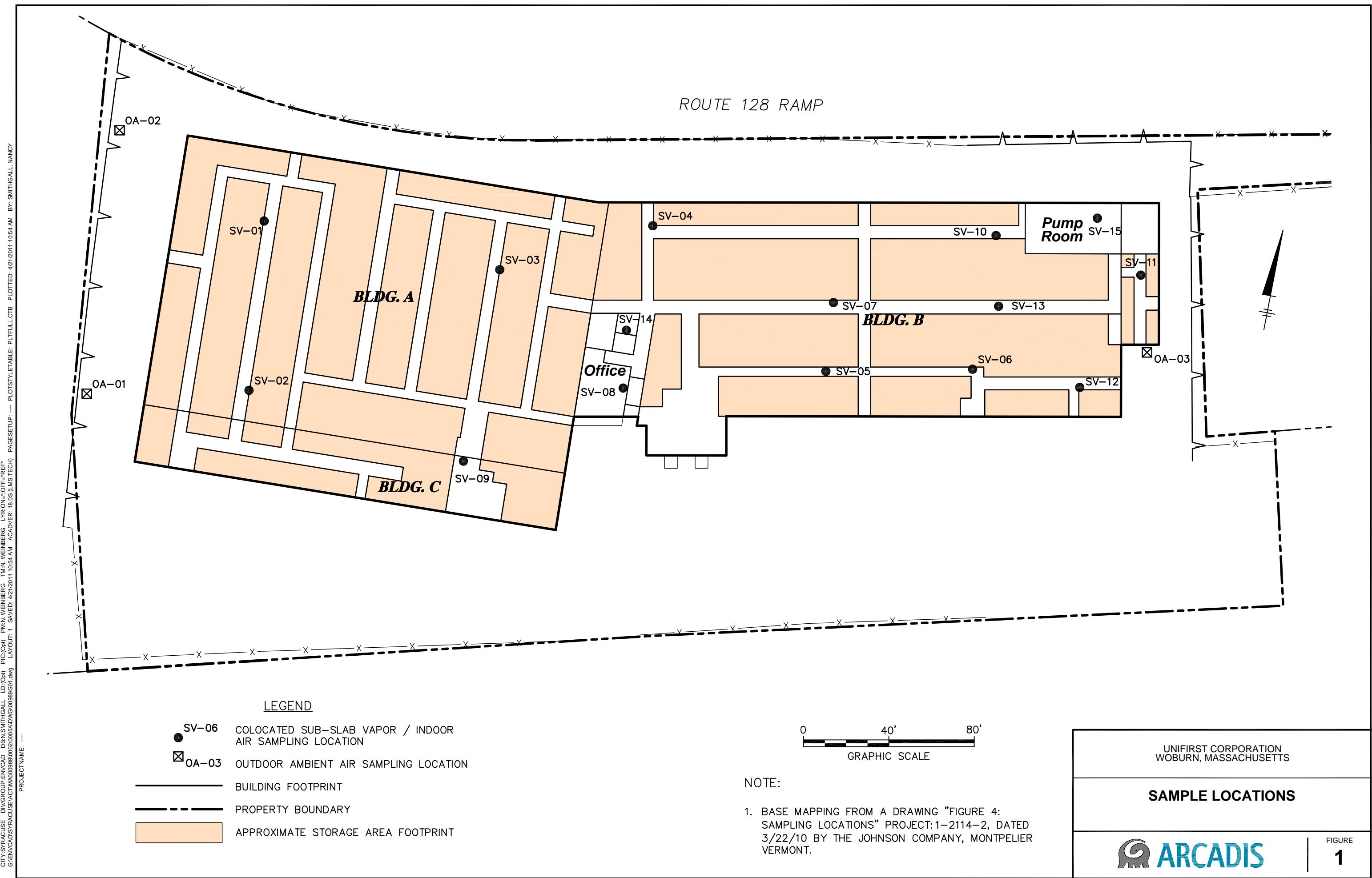
Exposure Area	Receptor	Total Cancer Risk	Total HI
IA-01	Resident	1.E-04	0.7
IA-02	Resident	1.E-04	0.7
IA-03	Resident	8.E-05	0.6
IA-04	Resident	1.E-04	1
IA-05	Resident	6.E-05	0.4
IA-06	Resident	2.E-04	1
IA-07	Resident	1.E-04	1
IA-08 (Office)	Resident	8.E-05	0.6
IA-09	Resident	2.E-05	0.2
IA-10	Resident	1.E-04	1
IA-11	Resident	1.E-04	0.6
IA-12	Resident	2.E-04	1
IA-13	Resident	2.E-04	2
IA-14 (Bathroom)	Resident	9.E-05	0.8
IA-15 (Pump Room)	Resident	8.E-05	0.3
East Warehouse	Resident	1.E-04	1
West Warehouse	Resident	9.E-05	0.5
Entire Warehouse	Resident	1.E-04	0.9

Note:

Bold values indicate cumulative cancer risk > 1×10^{-4} or cumulative HI > 1.

Abbreviation:

HI = hazard index.





Appendix A

2011 Risk Tables

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Long Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-01

Receptor:	Storage User - Long Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.53E-04	5	NA	NA	NA	1.31E-05	3E-06	NA	3E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.24E-06	2E-09	NA	NA	2E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	7.94E-04	0.007	NA	NA	NA	6.80E-05	1E-02	NA	1E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.88E-04	2.4	0.000026	1.19E-05	3E-07	3.32E-05	1E-05	3E-07	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.40E-05	0.002	0.00003	1.04E-06	3E-08	2.91E-06	1E-03	3E-08	1E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.90E-02	0.8	0.000011	5.81E-04	6E-06	1.63E-03	2E-03	6E-06	2E-03
Benzene	6.56E-04	0.03	0.0000078	2.01E-05	2E-07	5.62E-05	2E-03	2E-07	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.65E-04	0.1	0.000006	1.42E-05	9E-08	3.98E-05	4E-04	9E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.32E-04	0.098	0.000023	4.04E-06	9E-08	1.13E-05	1E-04	9E-08	1E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.38E-06	1E-04	NA	1E-04
Ethylbenzene	5.77E-04	1	0.000025	1.76E-05	4E-08	4.94E-05	5E-05	4E-08	5E-05
Methylene chloride	2.74E-03	1	0.0000047	8.36E-05	4E-08	2.34E-04	2E-04	4E-08	2E-04
Methyl tert butyl ether	2.16E-04	3	0.00000026	6.60E-06	2E-09	1.85E-05	6E-06	2E-09	6E-06
Naphthalene	1.51E-03	0.003	0.000034	4.60E-05	2E-06	1.29E-04	4E-02	2E-06	4E-02
Xylenes	2.04E-03	0.1	NA	NA	NA	1.75E-04	2E-03	NA	2E-03
Tetrachloroethene	3.32E-03	0.27	0.0000059	1.02E-04	6E-07	2.84E-04	1E-03	6E-07	1E-03
Toluene	3.86E-03	5	NA	NA	NA	3.30E-04	7E-05	NA	7E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	5.35E-05	NA	0.000002	1.64E-06	3E-09	NA	NA	3E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						9E-06	6E-02	9E-06	6E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Short Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-01

Receptor:	Storage User - Short Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.53E-04	5	NA	NA	NA	1.31E-05	3E-06	NA	3E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	2.48E-07	4E-10	NA	NA	4E-10	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	7.94E-04	0.007	NA	NA	NA	6.80E-05	1E-02	NA	1E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.88E-04	2.4	0.000026	2.37E-06	6E-08	3.32E-05	1E-05	6E-08	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.40E-05	0.002	0.00003	2.08E-07	6E-09	2.91E-06	1E-03	6E-09	1E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.90E-02	0.8	0.000011	1.16E-04	1E-06	1.63E-03	2E-03	1E-06	2E-03
Benzene	6.56E-04	0.03	0.0000078	4.01E-06	3E-08	5.62E-05	2E-03	3E-08	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.65E-04	0.1	0.000006	2.84E-06	2E-08	3.98E-05	4E-04	2E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.32E-04	0.098	0.000023	8.07E-07	2E-08	1.13E-05	1E-04	2E-08	1E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.38E-06	1E-04	NA	1E-04
Ethylbenzene	5.77E-04	1	0.000025	3.53E-06	9E-09	4.94E-05	5E-05	9E-09	5E-05
Methylene chloride	2.74E-03	1	0.0000047	1.67E-05	8E-09	2.34E-04	2E-04	8E-09	2E-04
Methyl tert butyl ether	2.16E-04	3	0.0000026	1.32E-06	3E-10	1.85E-05	6E-06	3E-10	6E-06
Naphthalene	1.51E-03	0.003	0.000034	9.21E-06	3E-07	1.29E-04	4E-02	3E-07	4E-02
Xylenes	2.04E-03	0.1	NA	NA	NA	1.75E-04	2E-03	NA	2E-03
Tetrachloroethene	3.32E-03	0.27	0.0000059	2.03E-05	1E-07	2.84E-04	1E-03	1E-07	1E-03
Toluene	3.86E-03	5	NA	NA	NA	3.30E-04	7E-05	NA	7E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	5.35E-05	NA	0.000002	3.27E-07	7E-10	NA	NA	7E-10	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-06	6E-02	2E-06	6E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Long Term

Soil Gas

Volatilization from Indoor Air

Warehouse

Sample Location IA-01

Receptor:	Commercial/Industrial Worker - Long
Medium of Origin:	Indoor Air
Exposure Medium:	Soil Gas
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Soil Gas (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.53E-04	5	NA	NA	NA	3.49E-05	7E-06	NA	7E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	3.30E-06	5E-09	NA	NA	5E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	7.94E-04	0.007	NA	NA	NA	1.81E-04	3E-02	NA	3E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.88E-04	2.4	0.000026	3.16E-05	8E-07	8.86E-05	4E-05	8E-07	4E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.40E-05	0.002	0.00003	2.77E-06	8E-08	7.76E-06	4E-03	8E-08	4E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.90E-02	0.8	0.000011	1.55E-03	2E-05	4.34E-03	5E-03	2E-05	5E-03
Benzene	6.56E-04	0.03	0.0000078	5.35E-05	4E-07	1.50E-04	5E-03	4E-07	5E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.65E-04	0.1	0.000006	3.79E-05	2E-07	1.06E-04	1E-03	2E-07	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.32E-04	0.098	0.000023	1.08E-05	2E-07	3.01E-05	3E-04	2E-07	3E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	9.02E-06	3E-04	NA	3E-04
Ethylbenzene	5.77E-04	1	0.000025	4.70E-05	1E-07	1.32E-04	1E-04	1E-07	1E-04
Methylene chloride	2.74E-03	1	0.0000047	2.23E-04	1E-07	6.24E-04	6E-04	1E-07	6E-04
Methyl tert butyl ether	2.16E-04	3	0.0000026	1.76E-05	5E-09	4.93E-05	2E-05	5E-09	2E-05
Naphthalene	1.51E-03	0.003	0.000034	1.23E-04	4E-06	3.44E-04	1E-01	4E-06	1E-01
Xylenes	2.04E-03	0.1	NA	NA	NA	4.66E-04	5E-03	NA	5E-03
Tetrachloroethene	3.32E-03	0.27	0.0000059	2.71E-04	2E-06	7.58E-04	3E-03	2E-06	3E-03
Toluene	3.86E-03	5	NA	NA	NA	8.80E-04	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	5.35E-05	NA	0.000002	4.36E-06	9E-09	NA	NA	9E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-05	2E-01	2E-05	2E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Short Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-01

Receptor:	Commercial/Industrial Worker - Short
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.53E-04	5	NA	NA	NA	3.49E-05	7E-06	NA	7E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	6.60E-07	1E-09	NA	NA	1E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	7.94E-04	0.007	NA	NA	NA	1.81E-04	3E-02	NA	3E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.88E-04	2.4	0.000026	6.33E-06	2E-07	8.86E-05	4E-05	2E-07	4E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.40E-05	0.002	0.00003	5.54E-07	2E-08	7.76E-06	4E-03	2E-08	4E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.90E-02	0.8	0.000011	3.10E-04	3E-06	4.34E-03	5E-03	3E-06	5E-03
Benzene	6.56E-04	0.03	0.0000078	1.07E-05	8E-08	1.50E-04	5E-03	8E-08	5E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.65E-04	0.1	0.000006	7.58E-06	5E-08	1.06E-04	1E-03	5E-08	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.32E-04	0.098	0.000023	2.15E-06	5E-08	3.01E-05	3E-04	5E-08	3E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	9.02E-06	3E-04	NA	3E-04
Ethylbenzene	5.77E-04	1	0.000025	9.41E-06	2E-08	1.32E-04	1E-04	2E-08	1E-04
Methylene chloride	2.74E-03	1	0.0000047	4.46E-05	2E-08	6.24E-04	6E-04	2E-08	6E-04
Methyl tert butyl ether	2.16E-04	3	0.0000026	3.52E-06	9E-10	4.93E-05	2E-05	9E-10	2E-05
Naphthalene	1.51E-03	0.003	0.000034	2.46E-05	8E-07	3.44E-04	1E-01	8E-07	1E-01
Xylenes	2.04E-03	0.1	NA	NA	NA	4.66E-04	5E-03	NA	5E-03
Tetrachloroethene	3.32E-03	0.27	0.0000059	5.41E-05	3E-07	7.58E-04	3E-03	3E-07	3E-03
Toluene	3.86E-03	5	NA	NA	NA	8.80E-04	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	5.35E-05	NA	0.000002	8.72E-07	2E-09	NA	NA	2E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						5E-06	2E-01	5E-06	2E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-01

Receptor:	Resident - Long Term	<input type="button" value="▼"/>
Medium of Origin:	Indoor Air	<input type="button" value="▼"/>
Exposure Medium:	Indoor Air	<input type="button" value="▼"/>
Exposure Area:	Warehouse	<input type="button" value="▼"/>
Depth:	NA	<input type="button" value="▼"/>
Duration:		<input type="button" value="▼"/>

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.53E-04	5	NA	NA	NA	1.46E-04	3E-05	NA	3E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.66E-05	3E-08	NA	NA	3E-08	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.79E-05	2E-04	NA	2E-04
1,2,4-Trimethylbenzene	7.94E-04	0.007	NA	NA	NA	7.61E-04	1E-01	NA	1E-01
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.88E-04	2.4	0.000026	1.59E-04	4E-06	3.72E-04	2E-04	4E-06	2E-04
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.40E-05	0.002	0.00003	1.40E-05	4E-07	3.26E-05	2E-02	4E-07	2E-02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.90E-02	0.8	0.000011	7.80E-03	9E-05	1.82E-02	2E-02	9E-05	2E-02
Benzene	6.56E-04	0.03	0.0000078	2.70E-04	2E-06	6.29E-04	2E-02	2E-06	2E-02
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.65E-04	0.1	0.000006	1.91E-04	1E-06	4.46E-04	4E-03	1E-06	4E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.32E-04	0.098	0.000023	5.42E-05	1E-06	1.27E-04	1E-03	1E-06	1E-03
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.79E-05	1E-03	NA	1E-03
Ethylbenzene	5.77E-04	1	0.000025	2.37E-04	6E-07	5.53E-04	6E-04	6E-07	6E-04
Methylene chloride	2.74E-03	1	0.0000047	1.12E-03	5E-07	2.62E-03	3E-03	5E-07	3E-03
Methyl tert butyl ether	2.16E-04	3	0.0000026	8.88E-05	2E-08	2.07E-04	7E-05	2E-08	7E-05
Naphthalene	1.51E-03	0.003	0.000034	6.19E-04	2E-05	1.44E-03	5E-01	2E-05	5E-01
Xylenes	2.04E-03	0.1	NA	NA	NA	1.96E-03	2E-02	NA	2E-02
Tetrachloroethene	3.32E-03	0.27	0.0000059	1.36E-03	8E-06	3.18E-03	1E-02	8E-06	1E-02
Toluene	3.86E-03	5	NA	NA	NA	3.70E-03	7E-04	NA	7E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	5.35E-05	NA	0.000002	2.20E-05	4E-08	NA	NA	4E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						1E-04	7E-01	1E-04	7E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Long Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-02

Receptor:	Storage User - Long Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.77E-04	5	NA	NA	NA	1.52E-05	3E-06	NA	3E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.24E-06	2E-09	NA	NA	2E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	7.12E-04	0.007	NA	NA	NA	6.10E-05	9E-03	NA	9E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.09E-04	2.4	0.000026	1.25E-05	3E-07	3.50E-05	1E-05	3E-07	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.75E-05	0.002	0.00003	1.15E-06	3E-08	3.21E-06	2E-03	3E-08	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.10E-02	0.8	0.000011	6.41E-04	7E-06	1.79E-03	2E-03	7E-06	2E-03
Benzene	7.47E-04	0.03	0.0000078	2.28E-05	2E-07	6.40E-05	2E-03	2E-07	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.87E-04	0.1	0.000006	1.49E-05	9E-08	4.17E-05	4E-04	9E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.56E-04	0.098	0.000023	4.77E-06	1E-07	1.34E-05	1E-04	1E-07	1E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.38E-06	1E-04	NA	1E-04
Ethylbenzene	5.66E-04	1	0.000025	1.73E-05	4E-08	4.85E-05	5E-05	4E-08	5E-05
Methylene chloride	2.76E-03	1	0.0000047	8.44E-05	4E-08	2.36E-04	2E-04	4E-08	2E-04
Methyl tert butyl ether	2.43E-04	3	0.00000026	7.43E-06	2E-09	2.08E-05	7E-06	2E-09	7E-06
Naphthalene	1.43E-03	0.003	0.000034	4.36E-05	1E-06	1.22E-04	4E-02	1E-06	4E-02
Xylenes	1.96E-03	0.1	NA	NA	NA	1.67E-04	2E-03	NA	2E-03
Tetrachloroethene	3.22E-03	0.27	0.0000059	9.85E-05	6E-07	2.76E-04	1E-03	6E-07	1E-03
Toluene	3.95E-03	5	NA	NA	NA	3.38E-04	7E-05	NA	7E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	5.35E-05	NA	0.000002	1.64E-06	3E-09	NA	NA	3E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					1E-05		6E-02	1E-05	6E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Short Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-02

Receptor:	Storage User - Short Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.77E-04	5	NA	NA	NA	1.52E-05	3E-06	NA	3E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	2.48E-07	4E-10	NA	NA	4E-10	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	7.12E-04	0.007	NA	NA	NA	6.10E-05	9E-03	NA	9E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.09E-04	2.4	0.000026	2.50E-06	6E-08	3.50E-05	1E-05	6E-08	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.75E-05	0.002	0.00003	2.29E-07	7E-09	3.21E-06	2E-03	7E-09	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.10E-02	0.8	0.000011	1.28E-04	1E-06	1.79E-03	2E-03	1E-06	2E-03
Benzene	7.47E-04	0.03	0.0000078	4.57E-06	4E-08	6.40E-05	2E-03	4E-08	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.87E-04	0.1	0.000006	2.98E-06	2E-08	4.17E-05	4E-04	2E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.56E-04	0.098	0.000023	9.54E-07	2E-08	1.34E-05	1E-04	2E-08	1E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.38E-06	1E-04	NA	1E-04
Ethylbenzene	5.66E-04	1	0.0000025	3.46E-06	9E-09	4.85E-05	5E-05	9E-09	5E-05
Methylene chloride	2.76E-03	1	0.00000047	1.69E-05	8E-09	2.36E-04	2E-04	8E-09	2E-04
Methyl tert butyl ether	2.43E-04	3	0.00000026	1.49E-06	4E-10	2.08E-05	7E-06	4E-10	7E-06
Naphthalene	1.43E-03	0.003	0.000034	8.71E-06	3E-07	1.22E-04	4E-02	3E-07	4E-02
Xylenes	1.96E-03	0.1	NA	NA	NA	1.67E-04	2E-03	NA	2E-03
Tetrachloroethene	3.22E-03	0.27	0.0000059	1.97E-05	1E-07	2.76E-04	1E-03	1E-07	1E-03
Toluene	3.95E-03	5	NA	NA	NA	3.38E-04	7E-05	NA	7E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	5.35E-05	NA	0.000002	3.27E-07	7E-10	NA	NA	7E-10	NA
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-06	6E-02	2E-06	6E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-02

Receptor:	Commercial/Industrial Worker - Long
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.77E-04	5	NA	NA	NA	4.05E-05	8E-06	NA	8E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	3.30E-06	5E-09	NA	NA	5E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	7.12E-04	0.007	NA	NA	NA	1.63E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.09E-04	2.4	0.000026	3.33E-05	9E-07	9.33E-05	4E-05	9E-07	4E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.75E-05	0.002	0.00003	3.06E-06	9E-08	8.56E-06	4E-03	9E-08	4E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.10E-02	0.8	0.000011	1.71E-03	2E-05	4.79E-03	6E-03	2E-05	6E-03
Benzene	7.47E-04	0.03	0.0000078	6.09E-05	5E-07	1.71E-04	6E-03	5E-07	6E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.87E-04	0.1	0.000006	3.97E-05	2E-07	1.11E-04	1E-03	2E-07	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.56E-04	0.098	0.000023	1.27E-05	3E-07	3.56E-05	4E-04	3E-07	4E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	9.02E-06	3E-04	NA	3E-04
Ethylbenzene	5.66E-04	1	0.000025	4.62E-05	1E-07	1.29E-04	1E-04	1E-07	1E-04
Methylene chloride	2.76E-03	1	0.0000047	2.25E-04	1E-07	6.30E-04	6E-04	1E-07	6E-04
Methyl tert butyl ether	2.43E-04	3	0.0000026	1.98E-05	5E-09	5.55E-05	2E-05	5E-09	2E-05
Naphthalene	1.43E-03	0.003	0.000034	1.16E-04	4E-06	3.25E-04	1E-01	4E-06	1E-01
Xylenes	1.96E-03	0.1	NA	NA	NA	4.47E-04	4E-03	NA	4E-03
Tetrachloroethene	3.22E-03	0.27	0.0000059	2.63E-04	2E-06	7.35E-04	3E-03	2E-06	3E-03
Toluene	3.95E-03	5	NA	NA	NA	9.02E-04	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	5.35E-05	NA	0.000002	4.36E-06	9E-09	NA	NA	9E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						3E-05	2E-01	3E-05	2E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Short Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-02

Receptor:	Commercial/Industrial Worker - Short
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.77E-04	5	NA	NA	NA	4.05E-05	8E-06	NA	8E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	6.60E-07	1E-09	NA	NA	1E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	7.12E-04	0.007	NA	NA	NA	1.63E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.09E-04	2.4	0.000026	6.66E-06	2E-07	9.33E-05	4E-05	2E-07	4E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.75E-05	0.002	0.00003	6.12E-07	2E-08	8.56E-06	4E-03	2E-08	4E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.10E-02	0.8	0.000011	3.42E-04	4E-06	4.79E-03	6E-03	4E-06	6E-03
Benzene	7.47E-04	0.03	0.0000078	1.22E-05	1E-07	1.71E-04	6E-03	1E-07	6E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.87E-04	0.1	0.000006	7.94E-06	5E-08	1.11E-04	1E-03	5E-08	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.56E-04	0.098	0.000023	2.54E-06	6E-08	3.56E-05	4E-04	6E-08	4E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	9.02E-06	3E-04	NA	3E-04
Ethylbenzene	5.66E-04	1	0.000025	9.23E-06	2E-08	1.29E-04	1E-04	2E-08	1E-04
Methylene chloride	2.76E-03	1	0.0000047	4.50E-05	2E-08	6.30E-04	6E-04	2E-08	6E-04
Methyl tert butyl ether	2.43E-04	3	0.0000026	3.96E-06	1E-09	5.55E-05	2E-05	1E-09	2E-05
Naphthalene	1.43E-03	0.003	0.000034	2.32E-05	8E-07	3.25E-04	1E-01	8E-07	1E-01
Xylenes	1.96E-03	0.1	NA	NA	NA	4.47E-04	4E-03	NA	4E-03
Tetrachloroethene	3.22E-03	0.27	0.0000059	5.25E-05	3E-07	7.35E-04	3E-03	3E-07	3E-03
Toluene	3.95E-03	5	NA	NA	NA	9.02E-04	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	5.35E-05	NA	0.000002	8.72E-07	2E-09	NA	NA	2E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						5E-06	2E-01	5E-06	2E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-02

Receptor:	Resident - Long Term	<input type="button" value="▼"/>
Medium of Origin:	Indoor Air	<input type="button" value="▼"/>
Exposure Medium:	Indoor Air	<input type="button" value="▼"/>
Exposure Area:	Warehouse	<input type="button" value="▼"/>
Depth:	NA	<input type="button" value="▼"/>
Duration:		<input type="button" value="▼"/>

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.77E-04	5	NA	NA	NA	1.70E-04	3E-05	NA	3E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.66E-05	3E-08	NA	NA	3E-08	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.79E-05	2E-04	NA	2E-04
1,2,4-Trimethylbenzene	7.12E-04	0.007	NA	NA	NA	6.83E-04	1E-01	NA	1E-01
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.09E-04	2.4	0.000026	1.68E-04	4E-06	3.92E-04	2E-04	4E-06	2E-04
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.75E-05	0.002	0.00003	1.54E-05	5E-07	3.60E-05	2E-02	5E-07	2E-02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.10E-02	0.8	0.000011	8.62E-03	9E-05	2.01E-02	3E-02	9E-05	3E-02
Benzene	7.47E-04	0.03	0.0000078	3.07E-04	2E-06	7.16E-04	2E-02	2E-06	2E-02
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.87E-04	0.1	0.000006	2.00E-04	1E-06	4.67E-04	5E-03	1E-06	5E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.56E-04	0.098	0.000023	6.41E-05	1E-06	1.50E-04	2E-03	1E-06	2E-03
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.79E-05	1E-03	NA	1E-03
Ethylbenzene	5.66E-04	1	0.000025	2.33E-04	6E-07	5.43E-04	5E-04	6E-07	5E-04
Methylene chloride	2.76E-03	1	0.0000047	1.13E-03	5E-07	2.65E-03	3E-03	5E-07	3E-03
Methyl tert butyl ether	2.43E-04	3	0.0000026	9.99E-05	3E-08	2.33E-04	8E-05	3E-08	8E-05
Naphthalene	1.43E-03	0.003	0.000034	5.86E-04	2E-05	1.37E-03	5E-01	2E-05	5E-01
Xylenes	1.96E-03	0.1	NA	NA	NA	1.88E-03	2E-02	NA	2E-02
Tetrachloroethene	3.22E-03	0.27	0.0000059	1.32E-03	8E-06	3.09E-03	1E-02	8E-06	1E-02
Toluene	3.95E-03	5	NA	NA	NA	3.79E-03	8E-04	NA	8E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	5.35E-05	NA	0.000002	2.20E-05	4E-08	NA	NA	4E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						1E-04	7E-01	1E-04	7E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Long Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-03

Receptor:	Storage User - Long Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.74E-04	5	NA	NA	NA	1.49E-05	3E-06	NA	3E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.24E-06	2E-09	NA	NA	2E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	7.52E-04	0.007	NA	NA	NA	6.43E-05	9E-03	NA	9E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.41E-04	2.4	0.000026	1.35E-05	4E-07	3.77E-05	2E-05	4E-07	2E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.40E-05	0.002	0.00003	1.35E-06	4E-08	3.77E-06	2E-03	4E-08	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	8.96E-03	0.8	0.000011	2.74E-04	3E-06	7.67E-04	1E-03	3E-06	1E-03
Benzene	7.33E-04	0.03	0.0000078	2.24E-05	2E-07	6.27E-05	2E-03	2E-07	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.49E-04	0.1	0.000006	1.37E-05	8E-08	3.84E-05	4E-04	8E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.13E-04	0.098	0.000023	3.44E-06	8E-08	9.63E-06	1E-04	8E-08	1E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.38E-06	1E-04	NA	1E-04
Ethylbenzene	6.05E-04	1	0.000025	1.85E-05	5E-08	5.18E-05	5E-05	5E-08	5E-05
Methylene chloride	2.39E-03	1	0.0000047	7.31E-05	3E-08	2.05E-04	2E-04	3E-08	2E-04
Methyl tert butyl ether	2.40E-04	3	0.00000026	7.32E-06	2E-09	2.05E-05	7E-06	2E-09	7E-06
Naphthalene	1.34E-03	0.003	0.000034	4.11E-05	1E-06	1.15E-04	4E-02	1E-06	4E-02
Xylenes	2.17E-03	0.1	NA	NA	NA	1.86E-04	2E-03	NA	2E-03
Tetrachloroethene	5.64E-03	0.27	0.0000059	1.72E-04	1E-06	4.83E-04	2E-03	1E-06	2E-03
Toluene	5.46E-03	5	NA	NA	NA	4.67E-04	9E-05	NA	9E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.33E-05	NA	0.000002	2.55E-06	5E-09	NA	NA	5E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					6E-06		6E-02	6E-06	6E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Short Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-03

Receptor:	Storage User - Short Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.74E-04	5	NA	NA	NA	1.49E-05	3E-06	NA	3E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	2.48E-07	4E-10	NA	NA	4E-10	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	7.52E-04	0.007	NA	NA	NA	6.43E-05	9E-03	NA	9E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.41E-04	2.4	0.000026	2.69E-06	7E-08	3.77E-05	2E-05	7E-08	2E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.40E-05	0.002	0.00003	2.69E-07	8E-09	3.77E-06	2E-03	8E-09	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	8.96E-03	0.8	0.000011	5.48E-05	6E-07	7.67E-04	1E-03	6E-07	1E-03
Benzene	7.33E-04	0.03	0.0000078	4.48E-06	3E-08	6.27E-05	2E-03	3E-08	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.49E-04	0.1	0.000006	2.75E-06	2E-08	3.84E-05	4E-04	2E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.13E-04	0.098	0.000023	6.88E-07	2E-08	9.63E-06	1E-04	2E-08	1E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.38E-06	1E-04	NA	1E-04
Ethylbenzene	6.05E-04	1	0.000025	3.70E-06	9E-09	5.18E-05	5E-05	9E-09	5E-05
Methylene chloride	2.39E-03	1	0.0000047	1.46E-05	7E-09	2.05E-04	2E-04	7E-09	2E-04
Methyl tert butyl ether	2.40E-04	3	0.0000026	1.46E-06	4E-10	2.05E-05	7E-06	4E-10	7E-06
Naphthalene	1.34E-03	0.003	0.000034	8.22E-06	3E-07	1.15E-04	4E-02	3E-07	4E-02
Xylenes	2.17E-03	0.1	NA	NA	NA	1.86E-04	2E-03	NA	2E-03
Tetrachloroethene	5.64E-03	0.27	0.0000059	3.45E-05	2E-07	4.83E-04	2E-03	2E-07	2E-03
Toluene	5.46E-03	5	NA	NA	NA	4.67E-04	9E-05	NA	9E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.33E-05	NA	0.000002	5.09E-07	1E-09	NA	NA	1E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						1E-06	6E-02	1E-06	6E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-03

Receptor:	Commercial/Industrial Worker - Long
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.74E-04	5	NA	NA	NA	3.98E-05	8E-06	NA	8E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	3.30E-06	5E-09	NA	NA	5E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	7.52E-04	0.007	NA	NA	NA	1.72E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.41E-04	2.4	0.000026	3.59E-05	9E-07	1.01E-04	4E-05	9E-07	4E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.40E-05	0.002	0.00003	3.59E-06	1E-07	1.00E-05	5E-03	1E-07	5E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	8.96E-03	0.8	0.000011	7.30E-04	8E-06	2.04E-03	3E-03	8E-06	3E-03
Benzene	7.33E-04	0.03	0.0000078	5.97E-05	5E-07	1.67E-04	6E-03	5E-07	6E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.49E-04	0.1	0.000006	3.66E-05	2E-07	1.03E-04	1E-03	2E-07	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.13E-04	0.098	0.000023	9.17E-06	2E-07	2.57E-05	3E-04	2E-07	3E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	9.02E-06	3E-04	NA	3E-04
Ethylbenzene	6.05E-04	1	0.000025	4.93E-05	1E-07	1.38E-04	1E-04	1E-07	1E-04
Methylene chloride	2.39E-03	1	0.0000047	1.95E-04	9E-08	5.46E-04	5E-04	9E-08	5E-04
Methyl tert butyl ether	2.40E-04	3	0.0000026	1.95E-05	5E-09	5.47E-05	2E-05	5E-09	2E-05
Naphthalene	1.34E-03	0.003	0.000034	1.10E-04	4E-06	3.07E-04	1E-01	4E-06	1E-01
Xylenes	2.17E-03	0.1	NA	NA	NA	4.95E-04	5E-03	NA	5E-03
Tetrachloroethene	5.64E-03	0.27	0.0000059	4.60E-04	3E-06	1.29E-03	5E-03	3E-06	5E-03
Toluene	5.46E-03	5	NA	NA	NA	1.25E-03	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.33E-05	NA	0.000002	6.79E-06	1E-08	NA	NA	1E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-05	2E-01	2E-05	2E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Short Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-03

Receptor:	Commercial/Industrial Worker - Short
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.74E-04	5	NA	NA	NA	3.98E-05	8E-06	NA	8E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	6.60E-07	1E-09	NA	NA	1E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	7.52E-04	0.007	NA	NA	NA	1.72E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.41E-04	2.4	0.000026	7.18E-06	2E-07	1.01E-04	4E-05	2E-07	4E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.40E-05	0.002	0.00003	7.18E-07	2E-08	1.00E-05	5E-03	2E-08	5E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	8.96E-03	0.8	0.000011	1.46E-04	2E-06	2.04E-03	3E-03	2E-06	3E-03
Benzene	7.33E-04	0.03	0.0000078	1.19E-05	9E-08	1.67E-04	6E-03	9E-08	6E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.49E-04	0.1	0.000006	7.32E-06	4E-08	1.03E-04	1E-03	4E-08	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.13E-04	0.098	0.000023	1.83E-06	4E-08	2.57E-05	3E-04	4E-08	3E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	9.02E-06	3E-04	NA	3E-04
Ethylbenzene	6.05E-04	1	0.000025	9.87E-06	2E-08	1.38E-04	1E-04	2E-08	1E-04
Methylene chloride	2.39E-03	1	0.0000047	3.90E-05	2E-08	5.46E-04	5E-04	2E-08	5E-04
Methyl tert butyl ether	2.40E-04	3	0.0000026	3.91E-06	1E-09	5.47E-05	2E-05	1E-09	2E-05
Naphthalene	1.34E-03	0.003	0.000034	2.19E-05	7E-07	3.07E-04	1E-01	7E-07	1E-01
Xylenes	2.17E-03	0.1	NA	NA	NA	4.95E-04	5E-03	NA	5E-03
Tetrachloroethene	5.64E-03	0.27	0.0000059	9.20E-05	5E-07	1.29E-03	5E-03	5E-07	5E-03
Toluene	5.46E-03	5	NA	NA	NA	1.25E-03	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.33E-05	NA	0.000002	1.36E-06	3E-09	NA	NA	3E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						3E-06	2E-01	3E-06	2E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-03

Receptor:	Resident - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:	Warehouse	▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.74E-04	5	NA	NA	NA	1.67E-04	3E-05	NA	3E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.66E-05	3E-08	NA	NA	3E-08	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.79E-05	2E-04	NA	2E-04
1,2,4-Trimethylbenzene	7.52E-04	0.007	NA	NA	NA	7.21E-04	1E-01	NA	1E-01
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.41E-04	2.4	0.000026	1.81E-04	5E-06	4.22E-04	2E-04	5E-06	2E-04
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.40E-05	0.002	0.00003	1.81E-05	5E-07	4.22E-05	2E-02	5E-07	2E-02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	8.96E-03	0.8	0.000011	3.68E-03	4E-05	8.59E-03	1E-02	4E-05	1E-02
Benzene	7.33E-04	0.03	0.0000078	3.01E-04	2E-06	7.02E-04	2E-02	2E-06	2E-02
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.49E-04	0.1	0.000006	1.85E-04	1E-06	4.31E-04	4E-03	1E-06	4E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.13E-04	0.098	0.000023	4.62E-05	1E-06	1.08E-04	1E-03	1E-06	1E-03
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.79E-05	1E-03	NA	1E-03
Ethylbenzene	6.05E-04	1	0.000025	2.49E-04	6E-07	5.80E-04	6E-04	6E-07	6E-04
Methylene chloride	2.39E-03	1	0.0000047	9.82E-04	5E-07	2.29E-03	2E-03	5E-07	2E-03
Methyl tert butyl ether	2.40E-04	3	0.0000026	9.84E-05	3E-08	2.30E-04	8E-05	3E-08	8E-05
Naphthalene	1.34E-03	0.003	0.000034	5.52E-04	2E-05	1.29E-03	4E-01	2E-05	4E-01
Xylenes	2.17E-03	0.1	NA	NA	NA	2.08E-03	2E-02	NA	2E-02
Tetrachloroethene	5.64E-03	0.27	0.0000059	2.32E-03	1E-05	5.41E-03	2E-02	1E-05	2E-02
Toluene	5.46E-03	5	NA	NA	NA	5.24E-03	1E-03	NA	1E-03
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.33E-05	NA	0.000002	3.42E-05	7E-08	NA	NA	7E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						8E-05	6E-01	8E-05	6E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Long Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-04

Receptor:	Storage User - Long Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	3.00E-04	5	NA	NA	NA	2.56E-05	5E-06	NA	5E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.24E-06	2E-09	NA	NA	2E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	9.94E-04	0.007	NA	NA	NA	8.51E-05	1E-02	NA	1E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	5.58E-04	2.4	0.000026	1.71E-05	4E-07	4.78E-05	2E-05	4E-07	2E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.40E-05	0.002	0.00003	1.04E-06	3E-08	2.91E-06	1E-03	3E-08	1E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	6.45E-03	0.8	0.000011	1.97E-04	2E-06	5.52E-04	7E-04	2E-06	7E-04
Benzene	7.65E-04	0.03	0.0000078	2.34E-05	2E-07	6.55E-05	2E-03	2E-07	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.53E-04	0.1	0.000006	1.38E-05	8E-08	3.87E-05	4E-04	8E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.30E-04	0.098	0.000023	3.96E-06	9E-08	1.11E-05	1E-04	9E-08	1E-04
cis-1,2-Dichloroethene	6.93E-05	0.035	NA	NA	NA	5.93E-06	2E-04	NA	2E-04
Ethylbenzene	7.55E-04	1	0.000025	2.31E-05	6E-08	4.64E-05	6E-05	6E-08	6E-05
Methylene chloride	1.68E-03	1	0.0000047	5.12E-05	2E-08	1.43E-04	1E-04	2E-08	1E-04
Methyl tert butyl ether	2.38E-04	3	0.0000026	7.26E-06	2E-09	2.03E-05	7E-06	2E-09	7E-06
Naphthalene	2.56E-03	0.003	0.000034	7.84E-05	3E-06	2.20E-04	7E-02	3E-06	7E-02
Xylenes	2.80E-03	0.1	NA	NA	NA	2.39E-04	2E-03	NA	2E-03
Tetrachloroethene	2.12E-02	0.27	0.0000059	6.47E-04	4E-06	1.81E-03	7E-03	4E-06	7E-03
Toluene	1.08E-02	5	NA	NA	NA	9.28E-04	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.37E-04	NA	0.000002	4.19E-06	8E-09	NA	NA	8E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						1E-05	1E-01	1E-05	1E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Short Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-04

Receptor:	Storage User - Short Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	3.00E-04	5	NA	NA	NA	2.56E-05	5E-06	NA	5E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	2.48E-07	4E-10	NA	NA	4E-10	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	9.94E-04	0.007	NA	NA	NA	8.51E-05	1E-02	NA	1E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	5.58E-04	2.4	0.000026	3.41E-06	9E-08	4.78E-05	2E-05	9E-08	2E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.40E-05	0.002	0.00003	2.08E-07	6E-09	2.91E-06	1E-03	6E-09	1E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	6.45E-03	0.8	0.000011	3.94E-05	4E-07	5.52E-04	7E-04	4E-07	7E-04
Benzene	7.65E-04	0.03	0.0000078	4.68E-06	4E-08	6.55E-05	2E-03	4E-08	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.53E-04	0.1	0.000006	2.77E-06	2E-08	3.87E-05	4E-04	2E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.30E-04	0.098	0.000023	7.92E-07	2E-08	1.11E-05	1E-04	2E-08	1E-04
cis-1,2-Dichloroethene	6.93E-05	0.035	NA	NA	NA	5.93E-06	2E-04	NA	2E-04
Ethylbenzene	7.55E-04	1	0.000025	4.61E-06	1E-08	4.64E-05	6E-05	1E-08	6E-05
Methylene chloride	1.68E-03	1	0.0000047	1.02E-05	5E-09	1.43E-04	1E-04	5E-09	1E-04
Methyl tert butyl ether	2.38E-04	3	0.0000026	1.45E-06	4E-10	2.03E-05	7E-06	4E-10	7E-06
Naphthalene	2.56E-03	0.003	0.000034	1.57E-05	5E-07	2.20E-04	7E-02	5E-07	7E-02
Xylenes	2.80E-03	0.1	NA	NA	NA	2.39E-04	2E-03	NA	2E-03
Tetrachloroethene	2.12E-02	0.27	0.0000059	1.29E-04	8E-07	1.81E-03	7E-03	8E-07	7E-03
Toluene	1.08E-02	5	NA	NA	NA	9.28E-04	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.37E-04	NA	0.000002	8.38E-07	2E-09	NA	NA	2E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-06	1E-01	2E-06	1E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-04

Receptor:	Commercial/Industrial Worker - Long
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	3.00E-04	5	NA	NA	NA	6.84E-05	1E-05	NA	1E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	3.30E-06	5E-09	NA	NA	5E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	9.94E-04	0.007	NA	NA	NA	2.27E-04	3E-02	NA	3E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	5.58E-04	2.4	0.000026	4.55E-05	1E-06	1.27E-04	5E-05	1E-06	5E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.40E-05	0.002	0.00003	2.77E-06	8E-08	7.76E-06	4E-03	8E-08	4E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	6.45E-03	0.8	0.000011	5.26E-04	6E-06	1.47E-03	2E-03	6E-06	2E-03
Benzene	7.65E-04	0.03	0.0000078	6.23E-05	5E-07	1.75E-04	6E-03	5E-07	6E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.53E-04	0.1	0.000006	3.69E-05	2E-07	1.03E-04	1E-03	2E-07	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.30E-04	0.098	0.000023	1.06E-05	2E-07	2.96E-05	3E-04	2E-07	3E-04
cis-1,2-Dichloroethene	6.93E-05	0.035	NA	NA	NA	1.58E-05	5E-04	NA	5E-04
Ethylbenzene	7.55E-04	1	0.000025	6.15E-05	2E-07	1.72E-04	2E-04	2E-07	2E-04
Methylene chloride	1.68E-03	1	0.0000047	1.37E-04	6E-08	3.82E-04	4E-04	6E-08	4E-04
Methyl tert butyl ether	2.38E-04	3	0.0000026	1.94E-05	5E-09	5.42E-05	2E-05	5E-09	2E-05
Naphthalene	2.56E-03	0.003	0.000034	2.09E-04	7E-06	5.85E-04	2E-01	7E-06	2E-01
Xylenes	2.80E-03	0.1	NA	NA	NA	6.38E-04	6E-03	NA	6E-03
Tetrachloroethene	2.12E-02	0.27	0.0000059	1.72E-03	1E-05	4.83E-03	2E-02	1E-05	2E-02
Toluene	1.08E-02	5	NA	NA	NA	2.47E-03	5E-04	NA	5E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.37E-04	NA	0.000002	1.12E-05	2E-08	NA	NA	2E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					3E-05		3E-01	3E-05	3E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Short Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-04

Receptor:	Commercial/Industrial Worker - Short
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	3.00E-04	5	NA	NA	NA	6.84E-05	1E-05	NA	1E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	6.60E-07	1E-09	NA	NA	1E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	9.94E-04	0.007	NA	NA	NA	2.27E-04	3E-02	NA	3E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	5.58E-04	2.4	0.000026	9.10E-06	2E-07	1.27E-04	5E-05	2E-07	5E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.40E-05	0.002	0.00003	5.54E-07	2E-08	7.76E-06	4E-03	2E-08	4E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	6.45E-03	0.8	0.000011	1.05E-04	1E-06	1.47E-03	2E-03	1E-06	2E-03
Benzene	7.65E-04	0.03	0.0000078	1.25E-05	1E-07	1.75E-04	6E-03	1E-07	6E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.53E-04	0.1	0.000006	7.38E-06	4E-08	1.03E-04	1E-03	4E-08	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.30E-04	0.098	0.000023	2.11E-06	5E-08	2.96E-05	3E-04	5E-08	3E-04
cis-1,2-Dichloroethene	6.93E-05	0.035	NA	NA	NA	1.58E-05	5E-04	NA	5E-04
Ethylbenzene	7.55E-04	1	0.000025	1.23E-05	3E-08	1.72E-04	2E-04	3E-08	2E-04
Methylene chloride	1.68E-03	1	0.0000047	2.73E-05	1E-08	3.82E-04	4E-04	1E-08	4E-04
Methyl tert butyl ether	2.38E-04	3	0.0000026	3.87E-06	1E-09	5.42E-05	2E-05	1E-09	2E-05
Naphthalene	2.56E-03	0.003	0.000034	4.18E-05	1E-06	5.85E-04	2E-01	1E-06	2E-01
Xylenes	2.80E-03	0.1	NA	NA	NA	6.38E-04	6E-03	NA	6E-03
Tetrachloroethene	2.12E-02	0.27	0.0000059	3.45E-04	2E-06	4.83E-03	2E-02	2E-06	2E-02
Toluene	1.08E-02	5	NA	NA	NA	2.47E-03	5E-04	NA	5E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.37E-04	NA	0.000002	2.23E-06	4E-09	NA	NA	4E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						5E-06	3E-01	5E-06	3E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-04

Receptor:	Resident - Long Term	<input type="button" value="▼"/>
Medium of Origin:	Indoor Air	<input type="button" value="▼"/>
Exposure Medium:	Indoor Air	<input type="button" value="▼"/>
Exposure Area:	Warehouse	<input type="button" value="▼"/>
Depth:	NA	<input type="button" value="▼"/>
Duration:		<input type="button" value="▼"/>

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	3.00E-04	5	NA	NA	NA	2.87E-04	6E-05	NA	6E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.66E-05	3E-08	NA	NA	3E-08	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.79E-05	2E-04	NA	2E-04
1,2,4-Trimethylbenzene	9.94E-04	0.007	NA	NA	NA	9.53E-04	1E-01	NA	1E-01
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	5.58E-04	2.4	0.000026	2.29E-04	6E-06	5.35E-04	2E-04	6E-06	2E-04
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.40E-05	0.002	0.00003	1.40E-05	4E-07	3.26E-05	2E-02	4E-07	2E-02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	6.45E-03	0.8	0.000011	2.65E-03	3E-05	6.18E-03	8E-03	3E-05	8E-03
Benzene	7.65E-04	0.03	0.0000078	3.14E-04	2E-06	7.33E-04	2E-02	2E-06	2E-02
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.53E-04	0.1	0.000006	1.86E-04	1E-06	4.34E-04	4E-03	1E-06	4E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.30E-04	0.098	0.000023	5.32E-05	1E-06	1.24E-04	1E-03	1E-06	1E-03
cis-1,2-Dichloroethene	6.93E-05	0.035	NA	NA	NA	6.64E-05	2E-03	NA	2E-03
Ethylbenzene	7.55E-04	1	0.000025	3.10E-04	8E-07	7.23E-04	7E-04	8E-07	7E-04
Methylene chloride	1.68E-03	1	0.0000047	6.88E-04	3E-07	1.61E-03	2E-03	3E-07	2E-03
Methyl tert butyl ether	2.38E-04	3	0.0000026	9.76E-05	3E-08	2.28E-04	8E-05	3E-08	8E-05
Naphthalene	2.56E-03	0.003	0.000034	1.05E-03	4E-05	2.46E-03	8E-01	4E-05	8E-01
Xylenes	2.80E-03	0.1	NA	NA	NA	2.68E-03	3E-02	NA	3E-02
Tetrachloroethene	2.12E-02	0.27	0.0000059	8.69E-03	5E-05	2.03E-02	8E-02	5E-05	8E-02
Toluene	1.08E-02	5	NA	NA	NA	1.04E-02	2E-03	NA	2E-03
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.37E-04	NA	0.000002	5.63E-05	1E-07	NA	NA	1E-07	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					1E-04		1E+00	1E-04	1E+00

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Long Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-05

Receptor:	Storage User - Long Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	2.32E-04	5	NA	NA	NA	1.98E-05	4E-06	NA	4E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.24E-06	2E-09	NA	NA	2E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	6.48E-04	0.007	NA	NA	NA	5.54E-05	8E-03	NA	8E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	2.81E-04	2.4	0.000026	8.59E-06	2E-07	2.41E-05	1E-05	2E-07	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.15E-05	0.002	0.00003	2.19E-06	7E-08	6.12E-06	3E-03	7E-08	3E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.05E-03	0.8	0.000011	3.20E-05	4E-07	8.95E-05	1E-04	4E-07	1E-04
Benzene	8.64E-04	0.03	0.0000078	2.64E-05	2E-07	7.39E-05	2E-03	2E-07	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.37E-04	0.1	0.000006	1.33E-05	8E-08	3.74E-05	4E-04	8E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.00E-04	0.098	0.000023	3.06E-06	7E-08	8.56E-06	9E-05	7E-08	9E-05
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.38E-06	1E-04	NA	1E-04
Ethylbenzene	6.46E-04	1	0.000025	1.98E-05	5E-08	5.53E-05	6E-05	5E-08	6E-05
Methylene chloride	8.70E-04	1	0.0000047	2.66E-05	1E-08	7.45E-05	7E-05	1E-08	7E-05
Methyl tert butyl ether	1.01E-04	3	0.0000026	3.09E-06	8E-10	8.65E-06	3E-06	8E-10	3E-06
Naphthalene	6.34E-04	0.003	0.000034	1.94E-05	7E-07	5.42E-05	2E-02	7E-07	2E-02
Xylenes	2.50E-03	0.1	NA	NA	NA	2.14E-04	2E-03	NA	2E-03
Tetrachloroethene	1.65E-02	0.27	0.0000059	5.03E-04	3E-06	1.41E-03	5E-03	3E-06	5E-03
Toluene	4.49E-03	5	NA	NA	NA	3.84E-04	8E-05	NA	8E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.58E-05	NA	0.000002	2.62E-06	5E-09	NA	NA	5E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						5E-06	4E-02	5E-06	4E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Short Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-05

Receptor:	Storage User - Short Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	2.32E-04	5	NA	NA	NA	1.98E-05	4E-06	NA	4E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	2.48E-07	4E-10	NA	NA	4E-10	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	6.48E-04	0.007	NA	NA	NA	5.54E-05	8E-03	NA	8E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	2.81E-04	2.4	0.000026	1.72E-06	4E-08	2.41E-05	1E-05	4E-08	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.15E-05	0.002	0.00003	4.37E-07	1E-08	6.12E-06	3E-03	1E-08	3E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.05E-03	0.8	0.000011	6.39E-06	7E-08	8.95E-05	1E-04	7E-08	1E-04
Benzene	8.64E-04	0.03	0.0000078	5.28E-06	4E-08	7.39E-05	2E-03	4E-08	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.37E-04	0.1	0.000006	2.67E-06	2E-08	3.74E-05	4E-04	2E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.00E-04	0.098	0.000023	6.12E-07	1E-08	8.56E-06	9E-05	1E-08	9E-05
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.38E-06	1E-04	NA	1E-04
Ethylbenzene	6.46E-04	1	0.000025	3.95E-06	1E-08	5.53E-05	6E-05	1E-08	6E-05
Methylene chloride	8.70E-04	1	0.0000047	5.32E-06	3E-09	7.45E-05	7E-05	3E-09	7E-05
Methyl tert butyl ether	1.01E-04	3	0.0000026	6.18E-07	2E-10	8.65E-06	3E-06	2E-10	3E-06
Naphthalene	6.34E-04	0.003	0.000034	3.87E-06	1E-07	5.42E-05	2E-02	1E-07	2E-02
Xylenes	2.50E-03	0.1	NA	NA	NA	2.14E-04	2E-03	NA	2E-03
Tetrachloroethene	1.65E-02	0.27	0.0000059	1.01E-04	6E-07	1.41E-03	5E-03	6E-07	5E-03
Toluene	4.49E-03	5	NA	NA	NA	3.84E-04	8E-05	NA	8E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.58E-05	NA	0.000002	5.24E-07	1E-09	NA	NA	1E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					9E-07		4E-02	9E-07	4E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-05

Receptor:	Commercial/Industrial Worker - Long
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	2.32E-04	5	NA	NA	NA	5.29E-05	1E-05	NA	1E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	3.30E-06	5E-09	NA	NA	5E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	6.48E-04	0.007	NA	NA	NA	1.48E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	2.81E-04	2.4	0.000026	2.29E-05	6E-07	6.42E-05	3E-05	6E-07	3E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.15E-05	0.002	0.00003	5.83E-06	2E-07	1.63E-05	8E-03	2E-07	8E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.05E-03	0.8	0.000011	8.52E-05	9E-07	2.39E-04	3E-04	9E-07	3E-04
Benzene	8.64E-04	0.03	0.0000078	7.04E-05	5E-07	1.97E-04	7E-03	5E-07	7E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.37E-04	0.1	0.000006	3.56E-05	2E-07	9.97E-05	1E-03	2E-07	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.00E-04	0.098	0.000023	8.15E-06	2E-07	2.28E-05	2E-04	2E-07	2E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	9.02E-06	3E-04	NA	3E-04
Ethylbenzene	6.46E-04	1	0.000025	5.27E-05	1E-07	1.47E-04	1E-04	1E-07	1E-04
Methylene chloride	8.70E-04	1	0.0000047	7.09E-05	3E-08	1.99E-04	2E-04	3E-08	2E-04
Methyl tert butyl ether	1.01E-04	3	0.0000026	8.24E-06	2E-09	2.31E-05	8E-06	2E-09	8E-06
Naphthalene	6.34E-04	0.003	0.000034	5.17E-05	2E-06	1.45E-04	5E-02	2E-06	5E-02
Xylenes	2.50E-03	0.1	NA	NA	NA	5.71E-04	6E-03	NA	6E-03
Tetrachloroethene	1.65E-02	0.27	0.0000059	1.34E-03	8E-06	3.76E-03	1E-02	8E-06	1E-02
Toluene	4.49E-03	5	NA	NA	NA	1.02E-03	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.58E-05	NA	0.000002	6.99E-06	1E-08	NA	NA	1E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						1E-05	1E-01	1E-05	1E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Short Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-05

Receptor:	Commercial/Industrial Worker - Short
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	2.32E-04	5	NA	NA	NA	5.29E-05	1E-05	NA	1E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	6.60E-07	1E-09	NA	NA	1E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	6.48E-04	0.007	NA	NA	NA	1.48E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	2.81E-04	2.4	0.000026	4.58E-06	1E-07	6.42E-05	3E-05	1E-07	3E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.15E-05	0.002	0.00003	1.17E-06	3E-08	1.63E-05	8E-03	3E-08	8E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.05E-03	0.8	0.000011	1.70E-05	2E-07	2.39E-04	3E-04	2E-07	3E-04
Benzene	8.64E-04	0.03	0.0000078	1.41E-05	1E-07	1.97E-04	7E-03	1E-07	7E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.37E-04	0.1	0.000006	7.12E-06	4E-08	9.97E-05	1E-03	4E-08	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.00E-04	0.098	0.000023	1.63E-06	4E-08	2.28E-05	2E-04	4E-08	2E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	9.02E-06	3E-04	NA	3E-04
Ethylbenzene	6.46E-04	1	0.0000025	1.05E-05	3E-08	1.47E-04	1E-04	3E-08	1E-04
Methylene chloride	8.70E-04	1	0.00000047	1.42E-05	7E-09	1.99E-04	2E-04	7E-09	2E-04
Methyl tert butyl ether	1.01E-04	3	0.00000026	1.65E-06	4E-10	2.31E-05	8E-06	4E-10	8E-06
Naphthalene	6.34E-04	0.003	0.000034	1.03E-05	4E-07	1.45E-04	5E-02	4E-07	5E-02
Xylenes	2.50E-03	0.1	NA	NA	NA	5.71E-04	6E-03	NA	6E-03
Tetrachloroethene	1.65E-02	0.27	0.0000059	2.69E-04	2E-06	3.76E-03	1E-02	2E-06	1E-02
Toluene	4.49E-03	5	NA	NA	NA	1.02E-03	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.58E-05	NA	0.000002	1.40E-06	3E-09	NA	NA	3E-09	NA
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						3E-06	1E-01	3E-06	1E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-05

Receptor:	Resident - Long Term	<input type="button" value="▼"/>
Medium of Origin:	Indoor Air	<input type="button" value="▼"/>
Exposure Medium:	Indoor Air	<input type="button" value="▼"/>
Exposure Area:	Warehouse	<input type="button" value="▼"/>
Depth:	NA	<input type="button" value="▼"/>
Duration:		<input type="button" value="▼"/>

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	2.32E-04	5	NA	NA	NA	2.22E-04	4E-05	NA	4E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.66E-05	3E-08	NA	NA	3E-08	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.79E-05	2E-04	NA	2E-04
1,2,4-Trimethylbenzene	6.48E-04	0.007	NA	NA	NA	6.21E-04	9E-02	NA	9E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	2.81E-04	2.4	0.000026	1.15E-04	3E-06	2.69E-04	1E-04	3E-06	1E-04
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	7.15E-05	0.002	0.00003	2.94E-05	9E-07	6.86E-05	3E-02	9E-07	3E-02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.05E-03	0.8	0.000011	4.30E-04	5E-06	1.00E-03	1E-03	5E-06	1E-03
Benzene	8.64E-04	0.03	0.0000078	3.55E-04	3E-06	8.28E-04	3E-02	3E-06	3E-02
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.37E-04	0.1	0.000006	1.79E-04	1E-06	4.19E-04	4E-03	1E-06	4E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.00E-04	0.098	0.000023	4.11E-05	9E-07	9.59E-05	1E-03	9E-07	1E-03
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.79E-05	1E-03	NA	1E-03
Ethylbenzene	6.46E-04	1	0.000025	2.65E-04	7E-07	6.19E-04	6E-04	7E-07	6E-04
Methylene chloride	8.70E-04	1	0.0000047	3.58E-04	2E-07	8.34E-04	8E-04	2E-07	8E-04
Methyl tert butyl ether	1.01E-04	3	0.0000026	4.15E-05	1E-08	9.68E-05	3E-05	1E-08	3E-05
Naphthalene	6.34E-04	0.003	0.000034	2.60E-04	9E-06	6.07E-04	2E-01	9E-06	2E-01
Xylenes	2.50E-03	0.1	NA	NA	NA	2.40E-03	2E-02	NA	2E-02
Tetrachloroethene	1.65E-02	0.27	0.0000059	6.77E-03	4E-05	1.58E-02	6E-02	4E-05	6E-02
Toluene	4.49E-03	5	NA	NA	NA	4.30E-03	9E-04	NA	9E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.58E-05	NA	0.000002	3.52E-05	7E-08	NA	NA	7E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						6E-05	4E-01	6E-05	4E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Long Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-06

Receptor:	Storage User - Long Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.74E-04	5	NA	NA	NA	4.06E-05	8E-06	NA	8E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.24E-06	2E-09	NA	NA	2E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	7.04E-04	0.007	NA	NA	NA	6.03E-05	9E-03	NA	9E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.15E-04	2.4	0.000026	1.27E-05	3E-07	3.55E-05	1E-05	3E-07	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.40E-05	0.002	0.00003	1.35E-06	4E-08	3.77E-06	2E-03	4E-08	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.54E-03	0.8	0.000011	4.72E-05	5E-07	1.32E-04	2E-04	5E-07	2E-04
Benzene	9.06E-04	0.03	0.0000078	2.77E-05	2E-07	7.76E-05	3E-03	2E-07	3E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.66E-04	0.1	0.000006	1.42E-05	9E-08	3.99E-05	4E-04	9E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.05E-04	0.098	0.000023	3.21E-06	7E-08	8.99E-06	9E-05	7E-08	9E-05
cis-1,2-Dichloroethene	7.33E-05	0.035	NA	NA	NA	6.27E-06	2E-04	NA	2E-04
Ethylbenzene	5.79E-04	1	0.000025	1.77E-05	4E-08	4.96E-05	5E-05	4E-08	5E-05
Methylene chloride	8.70E-04	1	0.0000047	2.66E-05	1E-08	7.45E-05	7E-05	1E-08	7E-05
Methyl tert butyl ether	9.20E-05	3	0.0000026	2.81E-06	7E-10	7.88E-06	3E-06	7E-10	3E-06
Naphthalene	2.20E-03	0.003	0.000034	6.71E-05	2E-06	1.88E-04	6E-02	2E-06	6E-02
Xylenes	2.12E-03	0.1	NA	NA	NA	1.81E-04	2E-03	NA	2E-03
Tetrachloroethene	4.90E-02	0.27	0.0000059	1.50E-03	9E-06	4.19E-03	2E-02	9E-06	2E-02
Toluene	5.45E-03	5	NA	NA	NA	4.67E-04	9E-05	NA	9E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.96E-04	NA	0.000002	5.99E-06	1E-08	NA	NA	1E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					1E-05		9E-02	1E-05	9E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Short Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-06

Receptor:	Storage User - Short Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.74E-04	5	NA	NA	NA	4.06E-05	8E-06	NA	8E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	2.48E-07	4E-10	NA	NA	4E-10	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	7.04E-04	0.007	NA	NA	NA	6.03E-05	9E-03	NA	9E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.15E-04	2.4	0.000026	2.53E-06	7E-08	3.55E-05	1E-05	7E-08	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.40E-05	0.002	0.00003	2.69E-07	8E-09	3.77E-06	2E-03	8E-09	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.54E-03	0.8	0.000011	9.45E-06	1E-07	1.32E-04	2E-04	1E-07	2E-04
Benzene	9.06E-04	0.03	0.0000078	5.54E-06	4E-08	7.76E-05	3E-03	4E-08	3E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.66E-04	0.1	0.000006	2.85E-06	2E-08	3.99E-05	4E-04	2E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.05E-04	0.098	0.000023	6.42E-07	1E-08	8.99E-06	9E-05	1E-08	9E-05
cis-1,2-Dichloroethene	7.33E-05	0.035	NA	NA	NA	6.27E-06	2E-04	NA	2E-04
Ethylbenzene	5.79E-04	1	0.000025	3.54E-06	9E-09	4.96E-05	5E-05	9E-09	5E-05
Methylene chloride	8.70E-04	1	0.0000047	5.32E-06	3E-09	7.45E-05	7E-05	3E-09	7E-05
Methyl tert butyl ether	9.20E-05	3	0.00000026	5.63E-07	1E-10	7.88E-06	3E-06	1E-10	3E-06
Naphthalene	2.20E-03	0.003	0.000034	1.34E-05	5E-07	1.88E-04	6E-02	5E-07	6E-02
Xylenes	2.12E-03	0.1	NA	NA	NA	1.81E-04	2E-03	NA	2E-03
Tetrachloroethene	4.90E-02	0.27	0.0000059	2.99E-04	2E-06	4.19E-03	2E-02	2E-06	2E-02
Toluene	5.45E-03	5	NA	NA	NA	4.67E-04	9E-05	NA	9E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.96E-04	NA	0.000002	1.20E-06	2E-09	NA	NA	2E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-06	9E-02	2E-06	9E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-06

Receptor:	Commercial/Industrial Worker - Long
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.74E-04	5	NA	NA	NA	1.08E-04	2E-05	NA	2E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	3.30E-06	5E-09	NA	NA	5E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	7.04E-04	0.007	NA	NA	NA	1.61E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.15E-04	2.4	0.000026	3.38E-05	9E-07	9.46E-05	4E-05	9E-07	4E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.40E-05	0.002	0.00003	3.59E-06	1E-07	1.00E-05	5E-03	1E-07	5E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.54E-03	0.8	0.000011	1.26E-04	1E-06	3.53E-04	4E-04	1E-06	4E-04
Benzene	9.06E-04	0.03	0.0000078	7.39E-05	6E-07	2.07E-04	7E-03	6E-07	7E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.66E-04	0.1	0.000006	3.80E-05	2E-07	1.06E-04	1E-03	2E-07	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.05E-04	0.098	0.000023	8.56E-06	2E-07	2.40E-05	2E-04	2E-07	2E-04
cis-1,2-Dichloroethene	7.33E-05	0.035	NA	NA	NA	1.67E-05	5E-04	NA	5E-04
Ethylbenzene	5.79E-04	1	0.000025	4.72E-05	1E-07	1.32E-04	1E-04	1E-07	1E-04
Methylene chloride	8.70E-04	1	0.0000047	7.09E-05	3E-08	1.99E-04	2E-04	3E-08	2E-04
Methyl tert butyl ether	9.20E-05	3	0.0000026	7.50E-06	2E-09	2.10E-05	7E-06	2E-09	7E-06
Naphthalene	2.20E-03	0.003	0.000034	1.79E-04	6E-06	5.01E-04	2E-01	6E-06	2E-01
Xylenes	2.12E-03	0.1	NA	NA	NA	4.83E-04	5E-03	NA	5E-03
Tetrachloroethene	4.90E-02	0.27	0.0000059	3.99E-03	2E-05	1.12E-02	4E-02	2E-05	4E-02
Toluene	5.45E-03	5	NA	NA	NA	1.24E-03	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.96E-04	NA	0.000002	1.60E-05	3E-08	NA	NA	3E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					3E-05		3E-01	3E-05	3E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Short Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-06

Receptor:	Commercial/Industrial Worker - Short
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.74E-04	5	NA	NA	NA	1.08E-04	2E-05	NA	2E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	6.60E-07	1E-09	NA	NA	1E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	7.04E-04	0.007	NA	NA	NA	1.61E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.15E-04	2.4	0.000026	6.76E-06	2E-07	9.46E-05	4E-05	2E-07	4E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.40E-05	0.002	0.00003	7.18E-07	2E-08	1.00E-05	5E-03	2E-08	5E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.54E-03	0.8	0.000011	2.52E-05	3E-07	3.53E-04	4E-04	3E-07	4E-04
Benzene	9.06E-04	0.03	0.0000078	1.48E-05	1E-07	2.07E-04	7E-03	1E-07	7E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.66E-04	0.1	0.000006	7.59E-06	5E-08	1.06E-04	1E-03	5E-08	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.05E-04	0.098	0.000023	1.71E-06	4E-08	2.40E-05	2E-04	4E-08	2E-04
cis-1,2-Dichloroethene	7.33E-05	0.035	NA	NA	NA	1.67E-05	5E-04	NA	5E-04
Ethylbenzene	5.79E-04	1	0.000025	9.44E-06	2E-08	1.32E-04	1E-04	2E-08	1E-04
Methylene chloride	8.70E-04	1	0.0000047	1.42E-05	7E-09	1.99E-04	2E-04	7E-09	2E-04
Methyl tert butyl ether	9.20E-05	3	0.0000026	1.50E-06	4E-10	2.10E-05	7E-06	4E-10	7E-06
Naphthalene	2.20E-03	0.003	0.000034	3.58E-05	1E-06	5.01E-04	2E-01	1E-06	2E-01
Xylenes	2.12E-03	0.1	NA	NA	NA	4.83E-04	5E-03	NA	5E-03
Tetrachloroethene	4.90E-02	0.27	0.0000059	7.98E-04	5E-06	1.12E-02	4E-02	5E-06	4E-02
Toluene	5.45E-03	5	NA	NA	NA	1.24E-03	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.96E-04	NA	0.000002	3.20E-06	6E-09	NA	NA	6E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						7E-06	3E-01	7E-06	3E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-06

Receptor:	Resident - Long Term	<input type="button" value="▼"/>
Medium of Origin:	Indoor Air	<input type="button" value="▼"/>
Exposure Medium:	Indoor Air	<input type="button" value="▼"/>
Exposure Area:	Warehouse	<input type="button" value="▼"/>
Depth:	NA	<input type="button" value="▼"/>
Duration:		<input type="button" value="▼"/>

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.74E-04	5	NA	NA	NA	4.55E-04	9E-05	NA	9E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.66E-05	3E-08	NA	NA	3E-08	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.79E-05	2E-04	NA	2E-04
1,2,4-Trimethylbenzene	7.04E-04	0.007	NA	NA	NA	6.75E-04	1E-01	NA	1E-01
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.15E-04	2.4	0.000026	1.70E-04	4E-06	3.97E-04	2E-04	4E-06	2E-04
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.40E-05	0.002	0.00003	1.81E-05	5E-07	4.22E-05	2E-02	5E-07	2E-02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.54E-03	0.8	0.000011	6.35E-04	7E-06	1.48E-03	2E-03	7E-06	2E-03
Benzene	9.06E-04	0.03	0.0000078	3.72E-04	3E-06	8.69E-04	3E-02	3E-06	3E-02
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.66E-04	0.1	0.000006	1.91E-04	1E-06	4.46E-04	4E-03	1E-06	4E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.05E-04	0.098	0.000023	4.32E-05	1E-06	1.01E-04	1E-03	1E-06	1E-03
cis-1,2-Dichloroethene	7.33E-05	0.035	NA	NA	NA	7.02E-05	2E-03	NA	2E-03
Ethylbenzene	5.79E-04	1	0.000025	2.38E-04	6E-07	5.55E-04	6E-04	6E-07	6E-04
Methylene chloride	8.70E-04	1	0.0000047	3.58E-04	2E-07	8.34E-04	8E-04	2E-07	8E-04
Methyl tert butyl ether	9.20E-05	3	0.0000026	3.78E-05	1E-08	8.82E-05	3E-05	1E-08	3E-05
Naphthalene	2.20E-03	0.003	0.000034	9.02E-04	3E-05	2.11E-03	7E-01	3E-05	7E-01
Xylenes	2.12E-03	0.1	NA	NA	NA	2.03E-03	2E-02	NA	2E-02
Tetrachloroethene	4.90E-02	0.27	0.0000059	2.01E-02	1E-04	4.69E-02	2E-01	1E-04	2E-01
Toluene	5.45E-03	5	NA	NA	NA	5.23E-03	1E-03	NA	1E-03
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.96E-04	NA	0.000002	8.05E-05	2E-07	NA	NA	2E-07	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					2E-04		1E+00	2E-04	1E+00

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Long Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-07

Receptor:	Storage User - Long Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	3.60E-04	5	NA	NA	NA	3.08E-05	6E-06	NA	6E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.24E-06	2E-09	NA	NA	2E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	6.61E-04	0.007	NA	NA	NA	5.65E-05	8E-03	NA	8E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.53E-04	2.4	0.000026	1.39E-05	4E-07	3.88E-05	2E-05	4E-07	2E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	5.40E-05	0.002	0.00003	1.65E-06	5E-08	4.62E-06	2E-03	5E-08	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.63E-03	0.8	0.000011	8.04E-05	9E-07	2.25E-04	3E-04	9E-07	3E-04
Benzene	8.06E-04	0.03	0.0000078	2.46E-05	2E-07	6.90E-05	2E-03	2E-07	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.59E-04	0.1	0.000006	1.40E-05	8E-08	3.93E-05	4E-04	8E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.00E-04	0.098	0.000023	3.06E-06	7E-08	8.56E-06	9E-05	7E-08	9E-05
cis-1,2-Dichloroethene	7.53E-05	0.035	NA	NA	NA	6.44E-06	2E-04	NA	2E-04
Ethylbenzene	5.86E-04	1	0.000025	1.79E-05	4E-08	5.01E-05	5E-05	4E-08	5E-05
Methylene chloride	1.31E-03	1	0.0000047	3.99E-05	2E-08	1.12E-04	1E-04	2E-08	1E-04
Methyl tert butyl ether	1.17E-04	3	0.0000026	3.58E-06	9E-10	1.00E-05	3E-06	9E-10	3E-06
Naphthalene	2.47E-03	0.003	0.000034	7.57E-05	3E-06	2.12E-04	7E-02	3E-06	7E-02
Xylenes	2.13E-03	0.1	NA	NA	NA	1.82E-04	2E-03	NA	2E-03
Tetrachloroethene	2.28E-02	0.27	0.0000059	6.96E-04	4E-06	1.95E-03	7E-03	4E-06	7E-03
Toluene	6.35E-03	5	NA	NA	NA	5.43E-04	1E-04	NA	1E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.88E-04	NA	0.000002	5.74E-06	1E-08	NA	NA	1E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						8E-06	9E-02	8E-06	9E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Short Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-07

Receptor:	Storage User - Short Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	3.60E-04	5	NA	NA	NA	3.08E-05	6E-06	NA	6E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	2.48E-07	4E-10	NA	NA	4E-10	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	6.61E-04	0.007	NA	NA	NA	5.65E-05	8E-03	NA	8E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.53E-04	2.4	0.000026	2.77E-06	7E-08	3.88E-05	2E-05	7E-08	2E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	5.40E-05	0.002	0.00003	3.30E-07	1E-08	4.62E-06	2E-03	1E-08	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.63E-03	0.8	0.000011	1.61E-05	2E-07	2.25E-04	3E-04	2E-07	3E-04
Benzene	8.06E-04	0.03	0.0000078	4.93E-06	4E-08	6.90E-05	2E-03	4E-08	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.59E-04	0.1	0.000006	2.81E-06	2E-08	3.93E-05	4E-04	2E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.00E-04	0.098	0.000023	6.12E-07	1E-08	8.56E-06	9E-05	1E-08	9E-05
cis-1,2-Dichloroethene	7.53E-05	0.035	NA	NA	NA	6.44E-06	2E-04	NA	2E-04
Ethylbenzene	5.86E-04	1	0.000025	3.58E-06	9E-09	5.01E-05	5E-05	9E-09	5E-05
Methylene chloride	1.31E-03	1	0.0000047	7.98E-06	4E-09	1.12E-04	1E-04	4E-09	1E-04
Methyl tert butyl ether	1.17E-04	3	0.0000026	7.16E-07	2E-10	1.00E-05	3E-06	2E-10	3E-06
Naphthalene	2.47E-03	0.003	0.000034	1.51E-05	5E-07	2.12E-04	7E-02	5E-07	7E-02
Xylenes	2.13E-03	0.1	NA	NA	NA	1.82E-04	2E-03	NA	2E-03
Tetrachloroethene	2.28E-02	0.27	0.0000059	1.39E-04	8E-07	1.95E-03	7E-03	8E-07	7E-03
Toluene	6.35E-03	5	NA	NA	NA	5.43E-04	1E-04	NA	1E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.88E-04	NA	0.000002	1.15E-06	2E-09	NA	NA	2E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-06	9E-02	2E-06	9E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-07

Receptor:	Commercial/Industrial Worker - Long
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	3.60E-04	5	NA	NA	NA	8.22E-05	2E-05	NA	2E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	3.30E-06	5E-09	NA	NA	5E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	6.61E-04	0.007	NA	NA	NA	1.51E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.53E-04	2.4	0.000026	3.69E-05	1E-06	1.03E-04	4E-05	1E-06	4E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	5.40E-05	0.002	0.00003	4.40E-06	1E-07	1.23E-05	6E-03	1E-07	6E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.63E-03	0.8	0.000011	2.14E-04	2E-06	6.00E-04	8E-04	2E-06	8E-04
Benzene	8.06E-04	0.03	0.0000078	6.57E-05	5E-07	1.84E-04	6E-03	5E-07	6E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.59E-04	0.1	0.000006	3.74E-05	2E-07	1.05E-04	1E-03	2E-07	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.00E-04	0.098	0.000023	8.15E-06	2E-07	2.28E-05	2E-04	2E-07	2E-04
cis-1,2-Dichloroethene	7.53E-05	0.035	NA	NA	NA	1.72E-05	5E-04	NA	5E-04
Ethylbenzene	5.86E-04	1	0.000025	4.77E-05	1E-07	1.34E-04	1E-04	1E-07	1E-04
Methylene chloride	1.31E-03	1	0.0000047	1.06E-04	5E-08	2.98E-04	3E-04	5E-08	3E-04
Methyl tert butyl ether	1.17E-04	3	0.0000026	9.54E-06	2E-09	2.67E-05	9E-06	2E-09	9E-06
Naphthalene	2.47E-03	0.003	0.000034	2.02E-04	7E-06	5.65E-04	2E-01	7E-06	2E-01
Xylenes	2.13E-03	0.1	NA	NA	NA	4.86E-04	5E-03	NA	5E-03
Tetrachloroethene	2.28E-02	0.27	0.0000059	1.86E-03	1E-05	5.19E-03	2E-02	1E-05	2E-02
Toluene	6.35E-03	5	NA	NA	NA	1.45E-03	3E-04	NA	3E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.88E-04	NA	0.000002	1.53E-05	3E-08	NA	NA	3E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-05	2E-01	2E-05	2E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Short Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-07

Receptor:	Commercial/Industrial Worker - Short
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	3.60E-04	5	NA	NA	NA	8.22E-05	2E-05	NA	2E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	6.60E-07	1E-09	NA	NA	1E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	6.61E-04	0.007	NA	NA	NA	1.51E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.53E-04	2.4	0.000026	7.39E-06	2E-07	1.03E-04	4E-05	2E-07	4E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	5.40E-05	0.002	0.00003	8.81E-07	3E-08	1.23E-05	6E-03	3E-08	6E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.63E-03	0.8	0.000011	4.29E-05	5E-07	6.00E-04	8E-04	5E-07	8E-04
Benzene	8.06E-04	0.03	0.0000078	1.31E-05	1E-07	1.84E-04	6E-03	1E-07	6E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.59E-04	0.1	0.000006	7.49E-06	4E-08	1.05E-04	1E-03	4E-08	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.00E-04	0.098	0.000023	1.63E-06	4E-08	2.28E-05	2E-04	4E-08	2E-04
cis-1,2-Dichloroethene	7.53E-05	0.035	NA	NA	NA	1.72E-05	5E-04	NA	5E-04
Ethylbenzene	5.86E-04	1	0.000025	9.55E-06	2E-08	1.34E-04	1E-04	2E-08	1E-04
Methylene chloride	1.31E-03	1	0.0000047	2.13E-05	1E-08	2.98E-04	3E-04	1E-08	3E-04
Methyl tert butyl ether	1.17E-04	3	0.0000026	1.91E-06	5E-10	2.67E-05	9E-06	5E-10	9E-06
Naphthalene	2.47E-03	0.003	0.000034	4.04E-05	1E-06	5.65E-04	2E-01	1E-06	2E-01
Xylenes	2.13E-03	0.1	NA	NA	NA	4.86E-04	5E-03	NA	5E-03
Tetrachloroethene	2.28E-02	0.27	0.0000059	3.71E-04	2E-06	5.19E-03	2E-02	2E-06	2E-02
Toluene	6.35E-03	5	NA	NA	NA	1.45E-03	3E-04	NA	3E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.88E-04	NA	0.000002	3.06E-06	6E-09	NA	NA	6E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						4E-06	2E-01	4E-06	2E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-07

Receptor:	Resident - Long Term	<input type="button" value="▼"/>
Medium of Origin:	Indoor Air	<input type="button" value="▼"/>
Exposure Medium:	Indoor Air	<input type="button" value="▼"/>
Exposure Area:	Warehouse	<input type="button" value="▼"/>
Depth:	NA	<input type="button" value="▼"/>
Duration:		<input type="button" value="▼"/>

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	3.60E-04	5	NA	NA	NA	3.45E-04	7E-05	NA	7E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.66E-05	3E-08	NA	NA	3E-08	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.79E-05	2E-04	NA	2E-04
1,2,4-Trimethylbenzene	6.61E-04	0.007	NA	NA	NA	6.33E-04	9E-02	NA	9E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.53E-04	2.4	0.000026	1.86E-04	5E-06	4.34E-04	2E-04	5E-06	2E-04
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	5.40E-05	0.002	0.00003	2.22E-05	7E-07	5.18E-05	3E-02	7E-07	3E-02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.63E-03	0.8	0.000011	1.08E-03	1E-05	2.52E-03	3E-03	1E-05	3E-03
Benzene	8.06E-04	0.03	0.0000078	3.31E-04	3E-06	7.73E-04	3E-02	3E-06	3E-02
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.59E-04	0.1	0.000006	1.89E-04	1E-06	4.40E-04	4E-03	1E-06	4E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.00E-04	0.098	0.000023	4.11E-05	9E-07	9.59E-05	1E-03	9E-07	1E-03
cis-1,2-Dichloroethene	7.53E-05	0.035	NA	NA	NA	7.22E-05	2E-03	NA	2E-03
Ethylbenzene	5.86E-04	1	0.000025	2.41E-04	6E-07	5.61E-04	6E-04	6E-07	6E-04
Methylene chloride	1.31E-03	1	0.0000047	5.36E-04	3E-07	1.25E-03	1E-03	3E-07	1E-03
Methyl tert butyl ether	1.17E-04	3	0.0000026	4.81E-05	1E-08	1.12E-04	4E-05	1E-08	4E-05
Naphthalene	2.47E-03	0.003	0.000034	1.02E-03	3E-05	2.37E-03	8E-01	3E-05	8E-01
Xylenes	2.13E-03	0.1	NA	NA	NA	2.04E-03	2E-02	NA	2E-02
Tetrachloroethene	2.28E-02	0.27	0.0000059	9.35E-03	6E-05	2.18E-02	8E-02	6E-05	8E-02
Toluene	6.35E-03	5	NA	NA	NA	6.08E-03	1E-03	NA	1E-03
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.88E-04	NA	0.000002	7.72E-05	2E-07	NA	NA	2E-07	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						1E-04	1E+00	1E-04	1E+00

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Long Term

Indoor Air

Volatilization from Indoor Air

Office

Sample Location IA-08

Receptor:	Commercial/Industrial Worker - Long
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Office
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	2.21E-04	5	NA	NA	NA	5.05E-05	1E-05	NA	1E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	3.30E-06	5E-09	NA	NA	5E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	7.82E-04	0.007	NA	NA	NA	1.78E-04	3E-02	NA	3E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.42E-04	2.4	0.000026	2.78E-05	7E-07	7.80E-05	3E-05	7E-07	3E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.85E-05	0.002	0.00003	3.14E-06	9E-08	8.79E-06	4E-03	9E-08	4E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.35E-03	0.8	0.000011	1.92E-04	2E-06	5.36E-04	7E-04	2E-06	7E-04
Benzene	8.79E-04	0.03	0.0000078	7.17E-05	6E-07	2.01E-04	7E-03	6E-07	7E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.84E-04	0.1	0.000006	3.95E-05	2E-07	1.11E-04	1E-03	2E-07	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.35E-04	0.098	0.000023	1.10E-05	3E-07	3.07E-05	3E-04	3E-07	3E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	9.02E-06	3E-04	NA	3E-04
Ethylbenzene	9.32E-04	1	0.000025	7.60E-05	2E-07	2.13E-04	2E-04	2E-07	2E-04
Methylene chloride	8.70E-04	1	0.0000047	7.09E-05	3E-08	1.99E-04	2E-04	3E-08	2E-04
Methyl tert butyl ether	1.50E-04	3	0.0000026	1.22E-05	3E-09	3.41E-05	1E-05	3E-09	1E-05
Naphthalene	1.20E-03	0.003	0.000034	9.77E-05	3E-06	2.74E-04	9E-02	3E-06	9E-02
Xylenes	3.28E-03	0.1	NA	NA	NA	7.48E-04	7E-03	NA	7E-03
Tetrachloroethene	1.68E-02	0.27	0.0000059	1.37E-03	8E-06	3.84E-03	1E-02	8E-06	1E-02
Toluene	5.76E-03	5	NA	NA	NA	1.31E-03	3E-04	NA	3E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	9.68E-05	NA	0.000002	7.89E-06	2E-08	NA	NA	2E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-05	2E-01	2E-05	2E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Short Term

Indoor Air

Volatilization from Indoor Air

Office

Sample Location IA-08

Receptor:	Commercial/Industrial Worker - Short
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Office
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	2.21E-04	5	NA	NA	NA	5.05E-05	1E-05	NA	1E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	6.60E-07	1E-09	NA	NA	1E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	7.82E-04	0.007	NA	NA	NA	1.78E-04	3E-02	NA	3E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.42E-04	2.4	0.000026	5.57E-06	1E-07	7.80E-05	3E-05	1E-07	3E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.85E-05	0.002	0.00003	6.28E-07	2E-08	8.79E-06	4E-03	2E-08	4E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.35E-03	0.8	0.000011	3.83E-05	4E-07	5.36E-04	7E-04	4E-07	7E-04
Benzene	8.79E-04	0.03	0.0000078	1.43E-05	1E-07	2.01E-04	7E-03	1E-07	7E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.84E-04	0.1	0.000006	7.89E-06	5E-08	1.11E-04	1E-03	5E-08	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.35E-04	0.098	0.000023	2.19E-06	5E-08	3.07E-05	3E-04	5E-08	3E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	9.02E-06	3E-04	NA	3E-04
Ethylbenzene	9.32E-04	1	0.000025	1.52E-05	4E-08	2.13E-04	2E-04	4E-08	2E-04
Methylene chloride	8.70E-04	1	0.0000047	1.42E-05	7E-09	1.99E-04	2E-04	7E-09	2E-04
Methyl tert butyl ether	1.50E-04	3	0.0000026	2.44E-06	6E-10	3.41E-05	1E-05	6E-10	1E-05
Naphthalene	1.20E-03	0.003	0.000034	1.95E-05	7E-07	2.74E-04	9E-02	7E-07	9E-02
Xylenes	3.28E-03	0.1	NA	NA	NA	7.48E-04	7E-03	NA	7E-03
Tetrachloroethene	1.68E-02	0.27	0.0000059	2.74E-04	2E-06	3.84E-03	1E-02	2E-06	1E-02
Toluene	5.76E-03	5	NA	NA	NA	1.31E-03	3E-04	NA	3E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	9.68E-05	NA	0.000002	1.58E-06	3E-09	NA	NA	3E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						3E-06	2E-01	3E-06	2E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

Office

Sample Location IA-08

Receptor:	Resident - Long Term	<input type="button" value="▼"/>
Medium of Origin:	Indoor Air	<input type="button" value="▼"/>
Exposure Medium:	Indoor Air	<input type="button" value="▼"/>
Exposure Area:	Office	<input type="button" value="▼"/>
Depth:	NA	<input type="button" value="▼"/>
Duration:		<input type="button" value="▼"/>

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	2.21E-04	5	NA	NA	NA	2.12E-04	4E-05	NA	4E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.66E-05	3E-08	NA	NA	3E-08	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.79E-05	2E-04	NA	2E-04
1,2,4-Trimethylbenzene	7.82E-04	0.007	NA	NA	NA	7.49E-04	1E-01	NA	1E-01
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.42E-04	2.4	0.000026	1.40E-04	4E-06	3.27E-04	1E-04	4E-06	1E-04
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.85E-05	0.002	0.00003	1.58E-05	5E-07	3.69E-05	2E-02	5E-07	2E-02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.35E-03	0.8	0.000011	9.66E-04	1E-05	2.25E-03	3E-03	1E-05	3E-03
Benzene	8.79E-04	0.03	0.0000078	3.61E-04	3E-06	8.43E-04	3E-02	3E-06	3E-02
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.84E-04	0.1	0.000006	1.99E-04	1E-06	4.64E-04	5E-03	1E-06	5E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.35E-04	0.098	0.000023	5.53E-05	1E-06	1.29E-04	1E-03	1E-06	1E-03
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.79E-05	1E-03	NA	1E-03
Ethylbenzene	9.32E-04	1	0.000025	3.83E-04	1E-06	8.94E-04	9E-04	1E-06	9E-04
Methylene chloride	8.70E-04	1	0.0000047	3.58E-04	2E-07	8.34E-04	8E-04	2E-07	8E-04
Methyl tert butyl ether	1.50E-04	3	0.0000026	6.14E-05	2E-08	1.43E-04	5E-05	2E-08	5E-05
Naphthalene	1.20E-03	0.003	0.000034	4.92E-04	2E-05	1.15E-03	4E-01	2E-05	4E-01
Xylenes	3.28E-03	0.1	NA	NA	NA	3.14E-03	3E-02	NA	3E-02
Tetrachloroethene	1.68E-02	0.27	0.0000059	6.90E-03	4E-05	1.61E-02	6E-02	4E-05	6E-02
Toluene	5.76E-03	5	NA	NA	NA	5.52E-03	1E-03	NA	1E-03
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	9.68E-05	NA	0.000002	3.98E-05	8E-08	NA	NA	8E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						8E-05	6E-01	8E-05	6E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Long Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-09

Receptor:	Storage User - Long Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	9.83E-05	5	NA	NA	NA	8.41E-06	2E-06	NA	2E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.24E-06	2E-09	NA	NA	2E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	2.76E-04	0.007	NA	NA	NA	2.36E-05	3E-03	NA	3E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1.42E-04	2.4	0.000026	4.33E-06	1E-07	1.21E-05	5E-06	1E-07	5E-06
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.60E-05	0.002	0.00003	2.02E-06	6E-08	5.65E-06	3E-03	6E-08	3E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.19E-04	0.8	0.000011	6.70E-06	7E-08	1.88E-05	2E-05	7E-08	2E-05
Benzene	9.74E-04	0.03	0.0000078	2.98E-05	2E-07	8.33E-05	3E-03	2E-07	3E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.47E-04	0.1	0.000006	1.37E-05	8E-08	3.82E-05	4E-04	8E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.22E-04	0.098	0.000023	3.73E-06	9E-08	1.04E-05	1E-04	9E-08	1E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.38E-06	1E-04	NA	1E-04
Ethylbenzene	6.05E-04	1	0.000025	1.85E-05	5E-08	5.18E-05	5E-05	5E-08	5E-05
Methylene chloride	8.70E-04	1	0.0000047	2.66E-05	1E-08	7.45E-05	7E-05	1E-08	7E-05
Methyl tert butyl ether	5.28E-04	3	0.0000026	1.61E-05	4E-09	4.52E-05	2E-05	4E-09	2E-05
Naphthalene	1.31E-04	0.003	0.000034	3.99E-06	1E-07	1.12E-05	4E-03	1E-07	4E-03
Xylenes	2.03E-03	0.1	NA	NA	NA	1.74E-04	2E-03	NA	2E-03
Tetrachloroethene	2.61E-03	0.27	0.0000059	7.98E-05	5E-07	2.24E-04	8E-04	5E-07	8E-04
Toluene	4.54E-03	5	NA	NA	NA	3.89E-04	8E-05	NA	8E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.33E-05	NA	0.000002	2.55E-06	5E-09	NA	NA	5E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						1E-06	2E-02	1E-06	2E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Short Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-09

Receptor:	Storage User - Short Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	9.83E-05	5	NA	NA	NA	8.41E-06	2E-06	NA	2E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	2.48E-07	4E-10	NA	NA	4E-10	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	2.76E-04	0.007	NA	NA	NA	2.36E-05	3E-03	NA	3E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1.42E-04	2.4	0.000026	8.67E-07	2E-08	1.21E-05	5E-06	2E-08	5E-06
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.60E-05	0.002	0.00003	4.04E-07	1E-08	5.65E-06	3E-03	1E-08	3E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.19E-04	0.8	0.000011	1.34E-06	1E-08	1.88E-05	2E-05	1E-08	2E-05
Benzene	9.74E-04	0.03	0.0000078	5.95E-06	5E-08	8.33E-05	3E-03	5E-08	3E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.47E-04	0.1	0.000006	2.73E-06	2E-08	3.82E-05	4E-04	2E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.22E-04	0.098	0.000023	7.46E-07	2E-08	1.04E-05	1E-04	2E-08	1E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.38E-06	1E-04	NA	1E-04
Ethylbenzene	6.05E-04	1	0.000025	3.70E-06	9E-09	5.18E-05	5E-05	9E-09	5E-05
Methylene chloride	8.70E-04	1	0.0000047	5.32E-06	3E-09	7.45E-05	7E-05	3E-09	7E-05
Methyl tert butyl ether	5.28E-04	3	0.0000026	3.23E-06	8E-10	4.52E-05	2E-05	8E-10	2E-05
Naphthalene	1.31E-04	0.003	0.000034	7.98E-07	3E-08	1.12E-05	4E-03	3E-08	4E-03
Xylenes	2.03E-03	0.1	NA	NA	NA	1.74E-04	2E-03	NA	2E-03
Tetrachloroethene	2.61E-03	0.27	0.0000059	1.60E-05	9E-08	2.24E-04	8E-04	9E-08	8E-04
Toluene	4.54E-03	5	NA	NA	NA	3.89E-04	8E-05	NA	8E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.33E-05	NA	0.000002	5.09E-07	1E-09	NA	NA	1E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					3E-07		2E-02	3E-07	2E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-09

Receptor:	Commercial/Industrial Worker - Long
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	9.83E-05	5	NA	NA	NA	2.24E-05	4E-06	NA	4E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	3.30E-06	5E-09	NA	NA	5E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	2.76E-04	0.007	NA	NA	NA	6.29E-05	9E-03	NA	9E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1.42E-04	2.4	0.000026	1.16E-05	3E-07	3.24E-05	1E-05	3E-07	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.60E-05	0.002	0.00003	5.38E-06	2E-07	1.51E-05	8E-03	2E-07	8E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.19E-04	0.8	0.000011	1.79E-05	2E-07	5.00E-05	6E-05	2E-07	6E-05
Benzene	9.74E-04	0.03	0.0000078	7.94E-05	6E-07	2.22E-04	7E-03	6E-07	7E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.47E-04	0.1	0.000006	3.64E-05	2E-07	1.02E-04	1E-03	2E-07	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.22E-04	0.098	0.000023	9.95E-06	2E-07	2.79E-05	3E-04	2E-07	3E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	9.02E-06	3E-04	NA	3E-04
Ethylbenzene	6.05E-04	1	0.000025	4.93E-05	1E-07	1.38E-04	1E-04	1E-07	1E-04
Methylene chloride	8.70E-04	1	0.0000047	7.09E-05	3E-08	1.99E-04	2E-04	3E-08	2E-04
Methyl tert butyl ether	5.28E-04	3	0.0000026	4.31E-05	1E-08	1.21E-04	4E-05	1E-08	4E-05
Naphthalene	1.31E-04	0.003	0.000034	1.06E-05	4E-07	2.98E-05	1E-02	4E-07	1E-02
Xylenes	2.03E-03	0.1	NA	NA	NA	4.64E-04	5E-03	NA	5E-03
Tetrachloroethene	2.61E-03	0.27	0.0000059	2.13E-04	1E-06	5.96E-04	2E-03	1E-06	2E-03
Toluene	4.54E-03	5	NA	NA	NA	1.04E-03	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.33E-05	NA	0.000002	6.79E-06	1E-08	NA	NA	1E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						4E-06	4E-02	4E-06	4E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Short Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-09

Receptor:	Commercial/Industrial Worker - Short
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	9.83E-05	5	NA	NA	NA	2.24E-05	4E-06	NA	4E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	6.60E-07	1E-09	NA	NA	1E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	2.76E-04	0.007	NA	NA	NA	6.29E-05	9E-03	NA	9E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1.42E-04	2.4	0.000026	2.31E-06	6E-08	3.24E-05	1E-05	6E-08	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.60E-05	0.002	0.00003	1.08E-06	3E-08	1.51E-05	8E-03	3E-08	8E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.19E-04	0.8	0.000011	3.57E-06	4E-08	5.00E-05	6E-05	4E-08	6E-05
Benzene	9.74E-04	0.03	0.0000078	1.59E-05	1E-07	2.22E-04	7E-03	1E-07	7E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.47E-04	0.1	0.000006	7.28E-06	4E-08	1.02E-04	1E-03	4E-08	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.22E-04	0.098	0.000023	1.99E-06	5E-08	2.79E-05	3E-04	5E-08	3E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	9.02E-06	3E-04	NA	3E-04
Ethylbenzene	6.05E-04	1	0.000025	9.87E-06	2E-08	1.38E-04	1E-04	2E-08	1E-04
Methylene chloride	8.70E-04	1	0.0000047	1.42E-05	7E-09	1.99E-04	2E-04	7E-09	2E-04
Methyl tert butyl ether	5.28E-04	3	0.0000026	8.61E-06	2E-09	1.21E-04	4E-05	2E-09	4E-05
Naphthalene	1.31E-04	0.003	0.000034	2.13E-06	7E-08	2.98E-05	1E-02	7E-08	1E-02
Xylenes	2.03E-03	0.1	NA	NA	NA	4.64E-04	5E-03	NA	5E-03
Tetrachloroethene	2.61E-03	0.27	0.0000059	4.26E-05	3E-07	5.96E-04	2E-03	3E-07	2E-03
Toluene	4.54E-03	5	NA	NA	NA	1.04E-03	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.33E-05	NA	0.000002	1.36E-06	3E-09	NA	NA	3E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					7E-07		4E-02	7E-07	4E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-09

Receptor:	Resident - Long Term	<input type="button" value="▼"/>
Medium of Origin:	Indoor Air	<input type="button" value="▼"/>
Exposure Medium:	Indoor Air	<input type="button" value="▼"/>
Exposure Area:	Warehouse	<input type="button" value="▼"/>
Depth:	NA	<input type="button" value="▼"/>
Duration:		<input type="button" value="▼"/>

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	9.83E-05	5	NA	NA	NA	9.42E-05	2E-05	NA	2E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.66E-05	3E-08	NA	NA	3E-08	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.79E-05	2E-04	NA	2E-04
1,2,4-Trimethylbenzene	2.76E-04	0.007	NA	NA	NA	2.64E-04	4E-02	NA	4E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1.42E-04	2.4	0.000026	5.83E-05	2E-06	1.36E-04	6E-05	2E-06	6E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.60E-05	0.002	0.00003	2.71E-05	8E-07	6.33E-05	3E-02	8E-07	3E-02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.19E-04	0.8	0.000011	9.00E-05	1E-06	2.10E-04	3E-04	1E-06	3E-04
Benzene	9.74E-04	0.03	0.0000078	4.00E-04	3E-06	9.33E-04	3E-02	3E-06	3E-02
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.47E-04	0.1	0.000006	1.83E-04	1E-06	4.28E-04	4E-03	1E-06	4E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.22E-04	0.098	0.000023	5.01E-05	1E-06	1.17E-04	1E-03	1E-06	1E-03
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.79E-05	1E-03	NA	1E-03
Ethylbenzene	6.05E-04	1	0.000025	2.49E-04	6E-07	5.80E-04	6E-04	6E-07	6E-04
Methylene chloride	8.70E-04	1	0.0000047	3.58E-04	2E-07	8.34E-04	8E-04	2E-07	8E-04
Methyl tert butyl ether	5.28E-04	3	0.0000026	2.17E-04	6E-08	5.06E-04	2E-04	6E-08	2E-04
Naphthalene	1.31E-04	0.003	0.000034	5.36E-05	2E-06	1.25E-04	4E-02	2E-06	4E-02
Xylenes	2.03E-03	0.1	NA	NA	NA	1.95E-03	2E-02	NA	2E-02
Tetrachloroethene	2.61E-03	0.27	0.0000059	1.07E-03	6E-06	2.50E-03	9E-03	6E-06	9E-03
Toluene	4.54E-03	5	NA	NA	NA	4.35E-03	9E-04	NA	9E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.33E-05	NA	0.000002	3.42E-05	7E-08	NA	NA	7E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-05	2E-01	2E-05	2E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Long Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-10

Receptor:	Storage User - Long Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	5.45E-04	5	NA	NA	NA	4.67E-05	9E-06	NA	9E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	1.21E-04	NA	0.0000016	3.71E-06	6E-09	NA	NA	6E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	8.04E-04	0.007	NA	NA	NA	6.88E-05	1E-02	NA	1E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	5.68E-04	2.4	0.000026	1.74E-05	5E-07	4.87E-05	2E-05	5E-07	2E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.65E-05	0.002	0.00003	1.12E-06	3E-08	3.13E-06	2E-03	3E-08	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	3.68E-03	0.8	0.000011	1.12E-04	1E-06	3.15E-04	4E-04	1E-06	4E-04
Benzene	7.57E-04	0.03	0.0000078	2.31E-05	2E-07	6.48E-05	2E-03	2E-07	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.59E-04	0.1	0.000006	1.40E-05	8E-08	3.93E-05	4E-04	8E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.35E-04	0.098	0.000023	4.14E-06	1E-07	1.16E-05	1E-04	1E-07	1E-04
cis-1,2-Dichloroethene	2.06E-04	0.035	NA	NA	NA	1.76E-05	5E-04	NA	5E-04
Ethylbenzene	6.33E-04	1	0.000025	1.94E-05	5E-08	5.42E-05	5E-05	5E-08	5E-05
Methylene chloride	1.83E-03	1	0.0000047	5.58E-05	3E-08	1.56E-04	2E-04	3E-08	2E-04
Methyl tert butyl ether	1.47E-04	3	0.0000026	4.48E-06	1E-09	1.25E-05	4E-06	1E-09	4E-06
Naphthalene	3.12E-03	0.003	0.000034	9.53E-05	3E-06	2.67E-04	9E-02	3E-06	9E-02
Xylenes	2.34E-03	0.1	NA	NA	NA	2.00E-04	2E-03	NA	2E-03
Tetrachloroethene	3.10E-02	0.27	0.0000059	9.49E-04	6E-06	2.66E-03	1E-02	6E-06	1E-02
Toluene	7.16E-03	5	NA	NA	NA	6.13E-04	1E-04	NA	1E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	2.07E-04	NA	0.000002	6.32E-06	1E-08	NA	NA	1E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						1E-05	1E-01	1E-05	1E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Short Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-10

Receptor:	Storage User - Short Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	5.45E-04	5	NA	NA	NA	4.67E-05	9E-06	NA	9E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	1.21E-04	NA	0.0000016	7.41E-07	1E-09	NA	NA	1E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	8.04E-04	0.007	NA	NA	NA	6.88E-05	1E-02	NA	1E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	5.68E-04	2.4	0.000026	3.48E-06	9E-08	4.87E-05	2E-05	9E-08	2E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.65E-05	0.002	0.00003	2.23E-07	7E-09	3.13E-06	2E-03	7E-09	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	3.68E-03	0.8	0.000011	2.25E-05	2E-07	3.15E-04	4E-04	2E-07	4E-04
Benzene	7.57E-04	0.03	0.0000078	4.63E-06	4E-08	6.48E-05	2E-03	4E-08	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.59E-04	0.1	0.000006	2.81E-06	2E-08	3.93E-05	4E-04	2E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.35E-04	0.098	0.000023	8.27E-07	2E-08	1.16E-05	1E-04	2E-08	1E-04
cis-1,2-Dichloroethene	2.06E-04	0.035	NA	NA	NA	1.76E-05	5E-04	NA	5E-04
Ethylbenzene	6.33E-04	1	0.000025	3.87E-06	1E-08	5.42E-05	5E-05	1E-08	5E-05
Methylene chloride	1.83E-03	1	0.0000047	1.12E-05	5E-09	1.56E-04	2E-04	5E-09	2E-04
Methyl tert butyl ether	1.47E-04	3	0.0000026	8.96E-07	2E-10	1.25E-05	4E-06	2E-10	4E-06
Naphthalene	3.12E-03	0.003	0.000034	1.91E-05	6E-07	2.67E-04	9E-02	6E-07	9E-02
Xylenes	2.34E-03	0.1	NA	NA	NA	2.00E-04	2E-03	NA	2E-03
Tetrachloroethene	3.10E-02	0.27	0.0000059	1.90E-04	1E-06	2.66E-03	1E-02	1E-06	1E-02
Toluene	7.16E-03	5	NA	NA	NA	6.13E-04	1E-04	NA	1E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	2.07E-04	NA	0.000002	1.26E-06	3E-09	NA	NA	3E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-06	1E-01	2E-06	1E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-10

Receptor:	Commercial/Industrial Worker - Long
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	5.45E-04	5	NA	NA	NA	1.24E-04	2E-05	NA	2E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	1.21E-04	NA	0.0000016	9.89E-06	2E-08	NA	NA	2E-08	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	8.04E-04	0.007	NA	NA	NA	1.84E-04	3E-02	NA	3E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	5.68E-04	2.4	0.000026	4.63E-05	1E-06	1.30E-04	5E-05	1E-06	5E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.65E-05	0.002	0.00003	2.98E-06	9E-08	8.33E-06	4E-03	9E-08	4E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	3.68E-03	0.8	0.000011	3.00E-04	3E-06	8.40E-04	1E-03	3E-06	1E-03
Benzene	7.57E-04	0.03	0.0000078	6.17E-05	5E-07	1.73E-04	6E-03	5E-07	6E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.59E-04	0.1	0.000006	3.74E-05	2E-07	1.05E-04	1E-03	2E-07	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.35E-04	0.098	0.000023	1.10E-05	3E-07	3.09E-05	3E-04	3E-07	3E-04
cis-1,2-Dichloroethene	2.06E-04	0.035	NA	NA	NA	4.70E-05	1E-03	NA	1E-03
Ethylbenzene	6.33E-04	1	0.000025	5.16E-05	1E-07	1.45E-04	1E-04	1E-07	1E-04
Methylene chloride	1.83E-03	1	0.0000047	1.49E-04	7E-08	4.17E-04	4E-04	7E-08	4E-04
Methyl tert butyl ether	1.47E-04	3	0.0000026	1.19E-05	3E-09	3.34E-05	1E-05	3E-09	1E-05
Naphthalene	3.12E-03	0.003	0.000034	2.54E-04	9E-06	7.12E-04	2E-01	9E-06	2E-01
Xylenes	2.34E-03	0.1	NA	NA	NA	5.34E-04	5E-03	NA	5E-03
Tetrachloroethene	3.10E-02	0.27	0.0000059	2.53E-03	1E-05	7.08E-03	3E-02	1E-05	3E-02
Toluene	7.16E-03	5	NA	NA	NA	1.63E-03	3E-04	NA	3E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	2.07E-04	NA	0.000002	1.69E-05	3E-08	NA	NA	3E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					3E-05		3E-01	3E-05	3E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Short Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-10

Receptor:	Commercial/Industrial Worker - Short
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	5.45E-04	5	NA	NA	NA	1.24E-04	2E-05	NA	2E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	1.21E-04	NA	0.0000016	1.98E-06	3E-09	NA	NA	3E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	8.04E-04	0.007	NA	NA	NA	1.84E-04	3E-02	NA	3E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	5.68E-04	2.4	0.000026	9.27E-06	2E-07	1.30E-04	5E-05	2E-07	5E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.65E-05	0.002	0.00003	5.95E-07	2E-08	8.33E-06	4E-03	2E-08	4E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	3.68E-03	0.8	0.000011	6.00E-05	7E-07	8.40E-04	1E-03	7E-07	1E-03
Benzene	7.57E-04	0.03	0.0000078	1.23E-05	1E-07	1.73E-04	6E-03	1E-07	6E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.59E-04	0.1	0.000006	7.48E-06	4E-08	1.05E-04	1E-03	4E-08	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.35E-04	0.098	0.000023	2.21E-06	5E-08	3.09E-05	3E-04	5E-08	3E-04
cis-1,2-Dichloroethene	2.06E-04	0.035	NA	NA	NA	4.70E-05	1E-03	NA	1E-03
Ethylbenzene	6.33E-04	1	0.000025	1.03E-05	3E-08	1.45E-04	1E-04	3E-08	1E-04
Methylene chloride	1.83E-03	1	0.0000047	2.98E-05	1E-08	4.17E-04	4E-04	1E-08	4E-04
Methyl tert butyl ether	1.47E-04	3	0.0000026	2.39E-06	6E-10	3.34E-05	1E-05	6E-10	1E-05
Naphthalene	3.12E-03	0.003	0.000034	5.08E-05	2E-06	7.12E-04	2E-01	2E-06	2E-01
Xylenes	2.34E-03	0.1	NA	NA	NA	5.34E-04	5E-03	NA	5E-03
Tetrachloroethene	3.10E-02	0.27	0.0000059	5.06E-04	3E-06	7.08E-03	3E-02	3E-06	3E-02
Toluene	7.16E-03	5	NA	NA	NA	1.63E-03	3E-04	NA	3E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	2.07E-04	NA	0.000002	3.37E-06	7E-09	NA	NA	7E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						6E-06	3E-01	6E-06	3E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-10

Receptor:	Resident - Long Term	<input type="button" value="▼"/>
Medium of Origin:	Indoor Air	<input type="button" value="▼"/>
Exposure Medium:	Indoor Air	<input type="button" value="▼"/>
Exposure Area:	Warehouse	<input type="button" value="▼"/>
Depth:	NA	<input type="button" value="▼"/>
Duration:		<input type="button" value="▼"/>

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	5.45E-04	5	NA	NA	NA	5.23E-04	1E-04	NA	1E-04
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	1.21E-04	NA	0.0000016	4.98E-05	8E-08	NA	NA	8E-08	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.79E-05	2E-04	NA	2E-04
1,2,4-Trimethylbenzene	8.04E-04	0.007	NA	NA	NA	7.71E-04	1E-01	NA	1E-01
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	5.68E-04	2.4	0.000026	2.34E-04	6E-06	5.45E-04	2E-04	6E-06	2E-04
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.65E-05	0.002	0.00003	1.50E-05	4E-07	3.50E-05	2E-02	4E-07	2E-02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	3.68E-03	0.8	0.000011	1.51E-03	2E-05	3.53E-03	4E-03	2E-05	4E-03
Benzene	7.57E-04	0.03	0.0000078	3.11E-04	2E-06	7.25E-04	2E-02	2E-06	2E-02
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.59E-04	0.1	0.000006	1.89E-04	1E-06	4.40E-04	4E-03	1E-06	4E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.35E-04	0.098	0.000023	5.56E-05	1E-06	1.30E-04	1E-03	1E-06	1E-03
cis-1,2-Dichloroethene	2.06E-04	0.035	NA	NA	NA	1.98E-04	6E-03	NA	6E-03
Ethylbenzene	6.33E-04	1	0.000025	2.60E-04	7E-07	6.07E-04	6E-04	7E-07	6E-04
Methylene chloride	1.83E-03	1	0.0000047	7.50E-04	4E-07	1.75E-03	2E-03	4E-07	2E-03
Methyl tert butyl ether	1.47E-04	3	0.0000026	6.02E-05	2E-08	1.40E-04	5E-05	2E-08	5E-05
Naphthalene	3.12E-03	0.003	0.000034	1.28E-03	4E-05	2.99E-03	1E+00	4E-05	1E+00
Xylenes	2.34E-03	0.1	NA	NA	NA	2.24E-03	2E-02	NA	2E-02
Tetrachloroethene	3.10E-02	0.27	0.0000059	1.28E-02	8E-05	2.98E-02	1E-01	8E-05	1E-01
Toluene	7.16E-03	5	NA	NA	NA	6.87E-03	1E-03	NA	1E-03
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	2.07E-04	NA	0.000002	8.50E-05	2E-07	NA	NA	2E-07	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						1E-04	1E+00	1E-04	1E+00

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Long Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-11

Receptor:	Storage User - Long Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	7.13E-04	5	NA	NA	NA	6.10E-05	1E-05	NA	1E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	7.38E-05	NA	0.0000016	2.26E-06	4E-09	NA	NA	4E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	2.95E-04	0.007	NA	NA	NA	2.52E-05	4E-03	NA	4E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1.41E-04	2.4	0.000026	4.30E-06	1E-07	1.21E-05	5E-06	1E-07	5E-06
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	5.75E-05	0.002	0.00003	1.76E-06	5E-08	4.92E-06	2E-03	5E-08	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.85E-04	0.8	0.000011	8.71E-06	1E-07	2.44E-05	3E-05	1E-07	3E-05
Benzene	6.73E-04	0.03	0.0000078	2.06E-05	2E-07	5.76E-05	2E-03	2E-07	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.62E-04	0.1	0.000006	1.41E-05	8E-08	3.96E-05	4E-04	8E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.21E-04	0.098	0.000023	3.69E-06	8E-08	1.03E-05	1E-04	8E-08	1E-04
cis-1,2-Dichloroethene	3.35E-04	0.035	NA	NA	NA	2.86E-05	8E-04	NA	8E-04
Ethylbenzene	3.21E-04	1	0.000025	9.82E-06	2E-08	2.75E-05	3E-05	2E-08	3E-05
Methylene chloride	8.70E-04	1	0.0000047	2.66E-05	1E-08	7.45E-05	7E-05	1E-08	7E-05
Methyl tert butyl ether	3.60E-05	3	0.0000026	1.10E-06	3E-10	3.08E-06	1E-06	3E-10	1E-06
Naphthalene	8.10E-04	0.003	0.000034	2.48E-05	8E-07	6.93E-05	2E-02	8E-07	2E-02
Xylenes	1.17E-03	0.1	NA	NA	NA	1.00E-04	1E-03	NA	1E-03
Tetrachloroethene	4.99E-02	0.27	0.0000059	1.52E-03	9E-06	4.27E-03	2E-02	9E-06	2E-02
Toluene	1.86E-03	5	NA	NA	NA	1.59E-04	3E-05	NA	3E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	7.77E-04	NA	0.000002	2.37E-05	5E-08	NA	NA	5E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						1E-05	5E-02	1E-05	5E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Short Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-11

Receptor:	Storage User - Short Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	7.13E-04	5	NA	NA	NA	6.10E-05	1E-05	NA	1E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	7.38E-05	NA	0.0000016	4.51E-07	7E-10	NA	NA	7E-10	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	2.95E-04	0.007	NA	NA	NA	2.52E-05	4E-03	NA	4E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1.41E-04	2.4	0.000026	8.61E-07	2E-08	1.21E-05	5E-06	2E-08	5E-06
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	5.75E-05	0.002	0.00003	3.52E-07	1E-08	4.92E-06	2E-03	1E-08	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.85E-04	0.8	0.000011	1.74E-06	2E-08	2.44E-05	3E-05	2E-08	3E-05
Benzene	6.73E-04	0.03	0.0000078	4.11E-06	3E-08	5.76E-05	2E-03	3E-08	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.62E-04	0.1	0.000006	2.83E-06	2E-08	3.96E-05	4E-04	2E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.21E-04	0.098	0.000023	7.38E-07	2E-08	1.03E-05	1E-04	2E-08	1E-04
cis-1,2-Dichloroethene	3.35E-04	0.035	NA	NA	NA	2.86E-05	8E-04	NA	8E-04
Ethylbenzene	3.21E-04	1	0.000025	1.96E-06	5E-09	2.75E-05	3E-05	5E-09	3E-05
Methylene chloride	8.70E-04	1	0.0000047	5.32E-06	3E-09	7.45E-05	7E-05	3E-09	7E-05
Methyl tert butyl ether	3.60E-05	3	0.00000026	2.20E-07	6E-11	3.08E-06	1E-06	6E-11	1E-06
Naphthalene	8.10E-04	0.003	0.000034	4.95E-06	2E-07	6.93E-05	2E-02	2E-07	2E-02
Xylenes	1.17E-03	0.1	NA	NA	NA	1.00E-04	1E-03	NA	1E-03
Tetrachloroethene	4.99E-02	0.27	0.0000059	3.05E-04	2E-06	4.27E-03	2E-02	2E-06	2E-02
Toluene	1.86E-03	5	NA	NA	NA	1.59E-04	3E-05	NA	3E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	7.77E-04	NA	0.000002	4.75E-06	9E-09	NA	NA	9E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-06	5E-02	2E-06	5E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-11

Receptor:	Commercial/Industrial Worker - Long
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	7.13E-04	5	NA	NA	NA	1.63E-04	3E-05	NA	3E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	7.38E-05	NA	0.0000016	6.01E-06	1E-08	NA	NA	1E-08	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	2.95E-04	0.007	NA	NA	NA	6.73E-05	1E-02	NA	1E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1.41E-04	2.4	0.000026	1.15E-05	3E-07	3.21E-05	1E-05	3E-07	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	5.75E-05	0.002	0.00003	4.69E-06	1E-07	1.31E-05	7E-03	1E-07	7E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.85E-04	0.8	0.000011	2.32E-05	3E-07	6.51E-05	8E-05	3E-07	8E-05
Benzene	6.73E-04	0.03	0.0000078	5.49E-05	4E-07	1.54E-04	5E-03	4E-07	5E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.62E-04	0.1	0.000006	3.77E-05	2E-07	1.05E-04	1E-03	2E-07	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.21E-04	0.098	0.000023	9.85E-06	2E-07	2.76E-05	3E-04	2E-07	3E-04
cis-1,2-Dichloroethene	3.35E-04	0.035	NA	NA	NA	7.64E-05	2E-03	NA	2E-03
Ethylbenzene	3.21E-04	1	0.000025	2.62E-05	7E-08	7.33E-05	7E-05	7E-08	7E-05
Methylene chloride	8.70E-04	1	0.0000047	7.09E-05	3E-08	1.99E-04	2E-04	3E-08	2E-04
Methyl tert butyl ether	3.60E-05	3	0.0000026	2.94E-06	8E-10	8.22E-06	3E-06	8E-10	3E-06
Naphthalene	8.10E-04	0.003	0.000034	6.60E-05	2E-06	1.85E-04	6E-02	2E-06	6E-02
Xylenes	1.17E-03	0.1	NA	NA	NA	2.67E-04	3E-03	NA	3E-03
Tetrachloroethene	4.99E-02	0.27	0.0000059	4.06E-03	2E-05	1.14E-02	4E-02	2E-05	4E-02
Toluene	1.86E-03	5	NA	NA	NA	4.25E-04	9E-05	NA	9E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	7.77E-04	NA	0.000002	6.33E-05	1E-07	NA	NA	1E-07	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						3E-05	1E-01	3E-05	1E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Short Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-11

Receptor:	Commercial/Industrial Worker - Short
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	7.13E-04	5	NA	NA	NA	1.63E-04	3E-05	NA	3E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	7.38E-05	NA	0.0000016	1.20E-06	2E-09	NA	NA	2E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	2.95E-04	0.007	NA	NA	NA	6.73E-05	1E-02	NA	1E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1.41E-04	2.4	0.000026	2.30E-06	6E-08	3.21E-05	1E-05	6E-08	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	5.75E-05	0.002	0.00003	9.38E-07	3E-08	1.31E-05	7E-03	3E-08	7E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.85E-04	0.8	0.000011	4.65E-06	5E-08	6.51E-05	8E-05	5E-08	8E-05
Benzene	6.73E-04	0.03	0.0000078	1.10E-05	9E-08	1.54E-04	5E-03	9E-08	5E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.62E-04	0.1	0.000006	7.53E-06	5E-08	1.05E-04	1E-03	5E-08	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.21E-04	0.098	0.000023	1.97E-06	5E-08	2.76E-05	3E-04	5E-08	3E-04
cis-1,2-Dichloroethene	3.35E-04	0.035	NA	NA	NA	7.64E-05	2E-03	NA	2E-03
Ethylbenzene	3.21E-04	1	0.0000025	5.24E-06	1E-08	7.33E-05	7E-05	1E-08	7E-05
Methylene chloride	8.70E-04	1	0.00000047	1.42E-05	7E-09	1.99E-04	2E-04	7E-09	2E-04
Methyl tert butyl ether	3.60E-05	3	0.00000026	5.87E-07	2E-10	8.22E-06	3E-06	2E-10	3E-06
Naphthalene	8.10E-04	0.003	0.000034	1.32E-05	4E-07	1.85E-04	6E-02	4E-07	6E-02
Xylenes	1.17E-03	0.1	NA	NA	NA	2.67E-04	3E-03	NA	3E-03
Tetrachloroethene	4.99E-02	0.27	0.0000059	8.13E-04	5E-06	1.14E-02	4E-02	5E-06	4E-02
Toluene	1.86E-03	5	NA	NA	NA	4.25E-04	9E-05	NA	9E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	7.77E-04	NA	0.000002	1.27E-05	3E-08	NA	NA	3E-08	NA
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					6E-06		1E-01	6E-06	1E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-11

Receptor:	Resident - Long Term	<input type="button" value="▼"/>
Medium of Origin:	Indoor Air	<input type="button" value="▼"/>
Exposure Medium:	Indoor Air	<input type="button" value="▼"/>
Exposure Area:	Warehouse	<input type="button" value="▼"/>
Depth:	NA	<input type="button" value="▼"/>
Duration:		<input type="button" value="▼"/>

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	7.13E-04	5	NA	NA	NA	6.83E-04	1E-04	NA	1E-04
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	7.38E-05	NA	0.0000016	3.03E-05	5E-08	NA	NA	5E-08	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.79E-05	2E-04	NA	2E-04
1,2,4-Trimethylbenzene	2.95E-04	0.007	NA	NA	NA	2.83E-04	4E-02	NA	4E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1.41E-04	2.4	0.000026	5.78E-05	2E-06	1.35E-04	6E-05	2E-06	6E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	5.75E-05	0.002	0.00003	2.36E-05	7E-07	5.51E-05	3E-02	7E-07	3E-02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.85E-04	0.8	0.000011	1.17E-04	1E-06	2.73E-04	3E-04	1E-06	3E-04
Benzene	6.73E-04	0.03	0.0000078	2.76E-04	2E-06	6.45E-04	2E-02	2E-06	2E-02
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.62E-04	0.1	0.000006	1.90E-04	1E-06	4.43E-04	4E-03	1E-06	4E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.21E-04	0.098	0.000023	4.96E-05	1E-06	1.16E-04	1E-03	1E-06	1E-03
cis-1,2-Dichloroethene	3.35E-04	0.035	NA	NA	NA	3.21E-04	9E-03	NA	9E-03
Ethylbenzene	3.21E-04	1	0.000025	1.32E-04	3E-07	3.08E-04	3E-04	3E-07	3E-04
Methylene chloride	8.70E-04	1	0.0000047	3.58E-04	2E-07	8.34E-04	8E-04	2E-07	8E-04
Methyl tert butyl ether	3.60E-05	3	0.0000026	1.48E-05	4E-09	3.45E-05	1E-05	4E-09	1E-05
Naphthalene	8.10E-04	0.003	0.000034	3.33E-04	1E-05	7.76E-04	3E-01	1E-05	3E-01
Xylenes	1.17E-03	0.1	NA	NA	NA	1.12E-03	1E-02	NA	1E-02
Tetrachloroethene	4.99E-02	0.27	0.0000059	2.05E-02	1E-04	4.78E-02	2E-01	1E-04	2E-01
Toluene	1.86E-03	5	NA	NA	NA	1.79E-03	4E-04	NA	4E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	7.77E-04	NA	0.000002	3.19E-04	6E-07	NA	NA	6E-07	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						1E-04	6E-01	1E-04	6E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Long Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-12

Receptor:	Storage User - Long Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.80E-04	5	NA	NA	NA	4.11E-05	8E-06	NA	8E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.24E-06	2E-09	NA	NA	2E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	8.02E-04	0.007	NA	NA	NA	6.86E-05	1E-02	NA	1E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.15E-04	2.4	0.000026	1.27E-05	3E-07	3.55E-05	1E-05	3E-07	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.20E-05	0.002	0.00003	1.90E-06	6E-08	5.31E-06	3E-03	6E-08	3E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.52E-03	0.8	0.000011	4.65E-05	5E-07	1.30E-04	2E-04	5E-07	2E-04
Benzene	8.59E-04	0.03	0.0000078	2.63E-05	2E-07	7.35E-05	2E-03	2E-07	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.56E-04	0.1	0.000006	1.39E-05	8E-08	3.90E-05	4E-04	8E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.03E-04	0.098	0.000023	3.13E-06	7E-08	8.78E-06	9E-05	7E-08	9E-05
cis-1,2-Dichloroethene	7.13E-05	0.035	NA	NA	NA	6.10E-06	2E-04	NA	2E-04
Ethylbenzene	5.95E-04	1	0.000025	1.82E-05	5E-08	5.09E-05	5E-05	5E-08	5E-05
Methylene chloride	8.70E-04	1	0.0000047	2.66E-05	1E-08	7.45E-05	7E-05	1E-08	7E-05
Methyl tert butyl ether	8.30E-05	3	0.0000026	2.54E-06	7E-10	7.11E-06	2E-06	7E-10	2E-06
Naphthalene	2.31E-03	0.003	0.000034	7.06E-05	2E-06	1.98E-04	7E-02	2E-06	7E-02
Xylenes	2.19E-03	0.1	NA	NA	NA	1.88E-04	2E-03	NA	2E-03
Tetrachloroethene	4.92E-02	0.27	0.0000059	1.50E-03	9E-06	4.21E-03	2E-02	9E-06	2E-02
Toluene	4.98E-03	5	NA	NA	NA	4.26E-04	9E-05	NA	9E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.88E-04	NA	0.000002	5.75E-06	1E-08	NA	NA	1E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						1E-05	1E-01	1E-05	1E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Short Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-12

Receptor:	Storage User - Short Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.80E-04	5	NA	NA	NA	4.11E-05	8E-06	NA	8E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	2.48E-07	4E-10	NA	NA	4E-10	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	8.02E-04	0.007	NA	NA	NA	6.86E-05	1E-02	NA	1E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.15E-04	2.4	0.000026	2.53E-06	7E-08	3.55E-05	1E-05	7E-08	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.20E-05	0.002	0.00003	3.79E-07	1E-08	5.31E-06	3E-03	1E-08	3E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.52E-03	0.8	0.000011	9.29E-06	1E-07	1.30E-04	2E-04	1E-07	2E-04
Benzene	8.59E-04	0.03	0.0000078	5.25E-06	4E-08	7.35E-05	2E-03	4E-08	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.56E-04	0.1	0.000006	2.79E-06	2E-08	3.90E-05	4E-04	2E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.03E-04	0.098	0.000023	6.27E-07	1E-08	8.78E-06	9E-05	1E-08	9E-05
cis-1,2-Dichloroethene	7.13E-05	0.035	NA	NA	NA	6.10E-06	2E-04	NA	2E-04
Ethylbenzene	5.95E-04	1	0.000025	3.64E-06	9E-09	5.09E-05	5E-05	9E-09	5E-05
Methylene chloride	8.70E-04	1	0.0000047	5.32E-06	3E-09	7.45E-05	7E-05	3E-09	7E-05
Methyl tert butyl ether	8.30E-05	3	0.0000026	5.08E-07	1E-10	7.11E-06	2E-06	1E-10	2E-06
Naphthalene	2.31E-03	0.003	0.000034	1.41E-05	5E-07	1.98E-04	7E-02	5E-07	7E-02
Xylenes	2.19E-03	0.1	NA	NA	NA	1.88E-04	2E-03	NA	2E-03
Tetrachloroethene	4.92E-02	0.27	0.0000059	3.01E-04	2E-06	4.21E-03	2E-02	2E-06	2E-02
Toluene	4.98E-03	5	NA	NA	NA	4.26E-04	9E-05	NA	9E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.88E-04	NA	0.000002	1.15E-06	2E-09	NA	NA	2E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						3E-06	1E-01	3E-06	1E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-12

Receptor:	Commercial/Industrial Worker - Long
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.80E-04	5	NA	NA	NA	1.10E-04	2E-05	NA	2E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	3.30E-06	5E-09	NA	NA	5E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	8.02E-04	0.007	NA	NA	NA	1.83E-04	3E-02	NA	3E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.15E-04	2.4	0.000026	3.38E-05	9E-07	9.46E-05	4E-05	9E-07	4E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.20E-05	0.002	0.00003	5.06E-06	2E-07	1.42E-05	7E-03	2E-07	7E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.52E-03	0.8	0.000011	1.24E-04	1E-06	3.47E-04	4E-04	1E-06	4E-04
Benzene	8.59E-04	0.03	0.0000078	7.00E-05	5E-07	1.96E-04	7E-03	5E-07	7E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.56E-04	0.1	0.000006	3.72E-05	2E-07	1.04E-04	1E-03	2E-07	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.03E-04	0.098	0.000023	8.36E-06	2E-07	2.34E-05	2E-04	2E-07	2E-04
cis-1,2-Dichloroethene	7.13E-05	0.035	NA	NA	NA	1.63E-05	5E-04	NA	5E-04
Ethylbenzene	5.95E-04	1	0.000025	4.85E-05	1E-07	1.36E-04	1E-04	1E-07	1E-04
Methylene chloride	8.70E-04	1	0.0000047	7.09E-05	3E-08	1.99E-04	2E-04	3E-08	2E-04
Methyl tert butyl ether	8.30E-05	3	0.0000026	6.77E-06	2E-09	1.89E-05	6E-06	2E-09	6E-06
Naphthalene	2.31E-03	0.003	0.000034	1.88E-04	6E-06	5.27E-04	2E-01	6E-06	2E-01
Xylenes	2.19E-03	0.1	NA	NA	NA	5.00E-04	5E-03	NA	5E-03
Tetrachloroethene	4.92E-02	0.27	0.0000059	4.01E-03	2E-05	1.12E-02	4E-02	2E-05	4E-02
Toluene	4.98E-03	5	NA	NA	NA	1.14E-03	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.88E-04	NA	0.000002	1.53E-05	3E-08	NA	NA	3E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						3E-05	3E-01	3E-05	3E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Short Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-12

Receptor:	Commercial/Industrial Worker - Short
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.80E-04	5	NA	NA	NA	1.10E-04	2E-05	NA	2E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	6.60E-07	1E-09	NA	NA	1E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	8.02E-04	0.007	NA	NA	NA	1.83E-04	3E-02	NA	3E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.15E-04	2.4	0.000026	6.76E-06	2E-07	9.46E-05	4E-05	2E-07	4E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.20E-05	0.002	0.00003	1.01E-06	3E-08	1.42E-05	7E-03	3E-08	7E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.52E-03	0.8	0.000011	2.48E-05	3E-07	3.47E-04	4E-04	3E-07	4E-04
Benzene	8.59E-04	0.03	0.0000078	1.40E-05	1E-07	1.96E-04	7E-03	1E-07	7E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.56E-04	0.1	0.000006	7.44E-06	4E-08	1.04E-04	1E-03	4E-08	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.03E-04	0.098	0.000023	1.67E-06	4E-08	2.34E-05	2E-04	4E-08	2E-04
cis-1,2-Dichloroethene	7.13E-05	0.035	NA	NA	NA	1.63E-05	5E-04	NA	5E-04
Ethylbenzene	5.95E-04	1	0.000025	9.70E-06	2E-08	1.36E-04	1E-04	2E-08	1E-04
Methylene chloride	8.70E-04	1	0.0000047	1.42E-05	7E-09	1.99E-04	2E-04	7E-09	2E-04
Methyl tert butyl ether	8.30E-05	3	0.0000026	1.35E-06	4E-10	1.89E-05	6E-06	4E-10	6E-06
Naphthalene	2.31E-03	0.003	0.000034	3.77E-05	1E-06	5.27E-04	2E-01	1E-06	2E-01
Xylenes	2.19E-03	0.1	NA	NA	NA	5.00E-04	5E-03	NA	5E-03
Tetrachloroethene	4.92E-02	0.27	0.0000059	8.02E-04	5E-06	1.12E-02	4E-02	5E-06	4E-02
Toluene	4.98E-03	5	NA	NA	NA	1.14E-03	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.88E-04	NA	0.000002	3.07E-06	6E-09	NA	NA	6E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					7E-06		3E-01	7E-06	3E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-12

Receptor:	Resident - Long Term	<input type="button" value="▼"/>
Medium of Origin:	Indoor Air	<input type="button" value="▼"/>
Exposure Medium:	Indoor Air	<input type="button" value="▼"/>
Exposure Area:	Warehouse	<input type="button" value="▼"/>
Depth:	NA	<input type="button" value="▼"/>
Duration:		<input type="button" value="▼"/>

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.80E-04	5	NA	NA	NA	4.60E-04	9E-05	NA	9E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.66E-05	3E-08	NA	NA	3E-08	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.79E-05	2E-04	NA	2E-04
1,2,4-Trimethylbenzene	8.02E-04	0.007	NA	NA	NA	7.69E-04	1E-01	NA	1E-01
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	4.15E-04	2.4	0.000026	1.70E-04	4E-06	3.97E-04	2E-04	4E-06	2E-04
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.20E-05	0.002	0.00003	2.55E-05	8E-07	5.95E-05	3E-02	8E-07	3E-02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.52E-03	0.8	0.000011	6.24E-04	7E-06	1.46E-03	2E-03	7E-06	2E-03
Benzene	8.59E-04	0.03	0.0000078	3.53E-04	3E-06	8.24E-04	3E-02	3E-06	3E-02
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.56E-04	0.1	0.000006	1.87E-04	1E-06	4.37E-04	4E-03	1E-06	4E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.03E-04	0.098	0.000023	4.21E-05	1E-06	9.83E-05	1E-03	1E-06	1E-03
cis-1,2-Dichloroethene	7.13E-05	0.035	NA	NA	NA	6.83E-05	2E-03	NA	2E-03
Ethylbenzene	5.95E-04	1	0.000025	2.44E-04	6E-07	5.70E-04	6E-04	6E-07	6E-04
Methylene chloride	8.70E-04	1	0.0000047	3.58E-04	2E-07	8.34E-04	8E-04	2E-07	8E-04
Methyl tert butyl ether	8.30E-05	3	0.00000026	3.41E-05	9E-09	7.96E-05	3E-05	9E-09	3E-05
Naphthalene	2.31E-03	0.003	0.000034	9.49E-04	3E-05	2.22E-03	7E-01	3E-05	7E-01
Xylenes	2.19E-03	0.1	NA	NA	NA	2.10E-03	2E-02	NA	2E-02
Tetrachloroethene	4.92E-02	0.27	0.0000059	2.02E-02	1E-04	4.71E-02	2E-01	1E-04	2E-01
Toluene	4.98E-03	5	NA	NA	NA	4.78E-03	1E-03	NA	1E-03
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.88E-04	NA	0.000002	7.73E-05	2E-07	NA	NA	2E-07	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-04	1E+00	2E-04	1E+00

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Long Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-13

Receptor:	Storage User - Long Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	7.13E-04	5	NA	NA	NA	6.10E-05	1E-05	NA	1E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	1.41E-04	NA	0.0000016	4.31E-06	7E-09	NA	NA	7E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	5.29E-04	0.007	NA	NA	NA	4.52E-05	6E-03	NA	6E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.62E-04	2.4	0.000026	1.11E-05	3E-07	3.10E-05	1E-05	3E-07	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.01E-05	0.002	0.00003	1.84E-06	6E-08	5.15E-06	3E-03	6E-08	3E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.14E-03	0.8	0.000011	3.48E-05	4E-07	9.75E-05	1E-04	4E-07	1E-04
Benzene	7.15E-04	0.03	0.0000078	2.19E-05	2E-07	6.12E-05	2E-03	2E-07	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.48E-04	0.1	0.000006	1.37E-05	8E-08	3.84E-05	4E-04	8E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.30E-04	0.098	0.000023	3.98E-06	9E-08	1.11E-05	1E-04	9E-08	1E-04
cis-1,2-Dichloroethene	2.54E-04	0.035	NA	NA	NA	2.17E-05	6E-04	NA	6E-04
Ethylbenzene	5.09E-04	1	0.0000025	1.56E-05	4E-08	4.36E-05	4E-05	4E-08	4E-05
Methylene chloride	1.75E-03	1	0.0000047	5.36E-05	3E-08	1.50E-04	2E-04	3E-08	2E-04
Methyl tert butyl ether	5.68E-05	3	0.00000026	1.74E-06	5E-10	4.86E-06	2E-06	5E-10	2E-06
Naphthalene	5.74E-03	0.003	0.000034	1.76E-04	6E-06	4.92E-04	2E-01	6E-06	2E-01
Xylenes	1.80E-03	0.1	NA	NA	NA	1.54E-04	2E-03	NA	2E-03
Tetrachloroethene	5.67E-02	0.27	0.0000059	1.73E-03	1E-05	4.85E-03	2E-02	1E-05	2E-02
Toluene	3.50E-03	5	NA	NA	NA	3.00E-04	6E-05	NA	6E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	3.81E-04	NA	0.000002	1.17E-05	2E-08	NA	NA	2E-08	NA
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-05	2E-01	2E-05	2E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Short Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-13

Receptor:	Storage User - Short Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	7.13E-04	5	NA	NA	NA	6.10E-05	1E-05	NA	1E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	1.41E-04	NA	0.0000016	8.62E-07	1E-09	NA	NA	1E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	5.29E-04	0.007	NA	NA	NA	4.52E-05	6E-03	NA	6E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.62E-04	2.4	0.000026	2.21E-06	6E-08	3.10E-05	1E-05	6E-08	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.01E-05	0.002	0.00003	3.68E-07	1E-08	5.15E-06	3E-03	1E-08	3E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.14E-03	0.8	0.000011	6.96E-06	8E-08	9.75E-05	1E-04	8E-08	1E-04
Benzene	7.15E-04	0.03	0.0000078	4.37E-06	3E-08	6.12E-05	2E-03	3E-08	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.48E-04	0.1	0.000006	2.74E-06	2E-08	3.84E-05	4E-04	2E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.30E-04	0.098	0.000023	7.95E-07	2E-08	1.11E-05	1E-04	2E-08	1E-04
cis-1,2-Dichloroethene	2.54E-04	0.035	NA	NA	NA	2.17E-05	6E-04	NA	6E-04
Ethylbenzene	5.09E-04	1	0.000025	3.11E-06	8E-09	4.36E-05	4E-05	8E-09	4E-05
Methylene chloride	1.75E-03	1	0.0000047	1.07E-05	5E-09	1.50E-04	2E-04	5E-09	2E-04
Methyl tert butyl ether	5.68E-05	3	0.0000026	3.47E-07	9E-11	4.86E-06	2E-06	9E-11	2E-06
Naphthalene	5.74E-03	0.003	0.000034	3.51E-05	1E-06	4.92E-04	2E-01	1E-06	2E-01
Xylenes	1.80E-03	0.1	NA	NA	NA	1.54E-04	2E-03	NA	2E-03
Tetrachloroethene	5.67E-02	0.27	0.0000059	3.47E-04	2E-06	4.85E-03	2E-02	2E-06	2E-02
Toluene	3.50E-03	5	NA	NA	NA	3.00E-04	6E-05	NA	6E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	3.81E-04	NA	0.000002	2.33E-06	5E-09	NA	NA	5E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					3E-06		2E-01	3E-06	2E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-13

Receptor:	Commercial/Industrial Worker - Long
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	7.13E-04	5	NA	NA	NA	1.63E-04	3E-05	NA	3E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	1.41E-04	NA	0.0000016	1.15E-05	2E-08	NA	NA	2E-08	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	5.29E-04	0.007	NA	NA	NA	1.21E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.62E-04	2.4	0.000026	2.95E-05	8E-07	8.25E-05	3E-05	8E-07	3E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.01E-05	0.002	0.00003	4.90E-06	1E-07	1.37E-05	7E-03	1E-07	7E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.14E-03	0.8	0.000011	9.28E-05	1E-06	2.60E-04	3E-04	1E-06	3E-04
Benzene	7.15E-04	0.03	0.0000078	5.83E-05	5E-07	1.63E-04	5E-03	5E-07	5E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.48E-04	0.1	0.000006	3.66E-05	2E-07	1.02E-04	1E-03	2E-07	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.30E-04	0.098	0.000023	1.06E-05	2E-07	2.97E-05	3E-04	2E-07	3E-04
cis-1,2-Dichloroethene	2.54E-04	0.035	NA	NA	NA	5.79E-05	2E-03	NA	2E-03
Ethylbenzene	5.09E-04	1	0.000025	4.15E-05	1E-07	1.16E-04	1E-04	1E-07	1E-04
Methylene chloride	1.75E-03	1	0.0000047	1.43E-04	7E-08	4.00E-04	4E-04	7E-08	4E-04
Methyl tert butyl ether	5.68E-05	3	0.00000026	4.63E-06	1E-09	1.30E-05	4E-06	1E-09	4E-06
Naphthalene	5.74E-03	0.003	0.000034	4.68E-04	2E-05	1.31E-03	4E-01	2E-05	4E-01
Xylenes	1.80E-03	0.1	NA	NA	NA	4.11E-04	4E-03	NA	4E-03
Tetrachloroethene	5.67E-02	0.27	0.0000059	4.62E-03	3E-05	1.29E-02	5E-02	3E-05	5E-02
Toluene	3.50E-03	5	NA	NA	NA	7.99E-04	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	3.81E-04	NA	0.000002	3.11E-05	6E-08	NA	NA	6E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						5E-05	5E-01	5E-05	5E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Short Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-13

Receptor:	Commercial/Industrial Worker - Short
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Warehouse
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	7.13E-04	5	NA	NA	NA	1.63E-04	3E-05	NA	3E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	1.41E-04	NA	0.0000016	2.30E-06	4E-09	NA	NA	4E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	5.29E-04	0.007	NA	NA	NA	1.21E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.62E-04	2.4	0.000026	5.90E-06	2E-07	8.25E-05	3E-05	2E-07	3E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.01E-05	0.002	0.00003	9.81E-07	3E-08	1.37E-05	7E-03	3E-08	7E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.14E-03	0.8	0.000011	1.86E-05	2E-07	2.60E-04	3E-04	2E-07	3E-04
Benzene	7.15E-04	0.03	0.0000078	1.17E-05	9E-08	1.63E-04	5E-03	9E-08	5E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.48E-04	0.1	0.000006	7.31E-06	4E-08	1.02E-04	1E-03	4E-08	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.30E-04	0.098	0.000023	2.12E-06	5E-08	2.97E-05	3E-04	5E-08	3E-04
cis-1,2-Dichloroethene	2.54E-04	0.035	NA	NA	NA	5.79E-05	2E-03	NA	2E-03
Ethylbenzene	5.09E-04	1	0.000025	8.30E-06	2E-08	1.16E-04	1E-04	2E-08	1E-04
Methylene chloride	1.75E-03	1	0.0000047	2.86E-05	1E-08	4.00E-04	4E-04	1E-08	4E-04
Methyl tert butyl ether	5.68E-05	3	0.0000026	9.25E-07	2E-10	1.30E-05	4E-06	2E-10	4E-06
Naphthalene	5.74E-03	0.003	0.000034	9.36E-05	3E-06	1.31E-03	4E-01	3E-06	4E-01
Xylenes	1.80E-03	0.1	NA	NA	NA	4.11E-04	4E-03	NA	4E-03
Tetrachloroethene	5.67E-02	0.27	0.0000059	9.24E-04	5E-06	1.29E-02	5E-02	5E-06	5E-02
Toluene	3.50E-03	5	NA	NA	NA	7.99E-04	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	3.81E-04	NA	0.000002	6.22E-06	1E-08	NA	NA	1E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						9E-06	5E-01	9E-06	5E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

Warehouse

Sample Location IA-13

Receptor:	Resident - Long Term	▼
Medium of Origin:	Indoor Air	▼
Exposure Medium:	Indoor Air	▼
Exposure Area:	Warehouse	▼
Depth:	NA	▼
Duration:		▼

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	7.13E-04	5	NA	NA	NA	6.83E-04	1E-04	NA	1E-04
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	1.41E-04	NA	0.0000016	5.79E-05	9E-08	NA	NA	9E-08	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.79E-05	2E-04	NA	2E-04
1,2,4-Trimethylbenzene	5.29E-04	0.007	NA	NA	NA	5.07E-04	7E-02	NA	7E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.62E-04	2.4	0.000026	1.49E-04	4E-06	3.47E-04	1E-04	4E-06	1E-04
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	6.01E-05	0.002	0.00003	2.47E-05	7E-07	5.77E-05	3E-02	7E-07	3E-02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.14E-03	0.8	0.000011	4.68E-04	5E-06	1.09E-03	1E-03	5E-06	1E-03
Benzene	7.15E-04	0.03	0.0000078	2.94E-04	2E-06	6.86E-04	2E-02	2E-06	2E-02
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.48E-04	0.1	0.000006	1.84E-04	1E-06	4.30E-04	4E-03	1E-06	4E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.30E-04	0.098	0.000023	5.34E-05	1E-06	1.25E-04	1E-03	1E-06	1E-03
cis-1,2-Dichloroethene	2.54E-04	0.035	NA	NA	NA	2.43E-04	7E-03	NA	7E-03
Ethylbenzene	5.09E-04	1	0.0000025	2.09E-04	5E-07	4.88E-04	5E-04	5E-07	5E-04
Methylene chloride	1.75E-03	1	0.00000047	7.20E-04	3E-07	1.68E-03	2E-03	3E-07	2E-03
Methyl tert butyl ether	5.68E-05	3	0.00000026	2.33E-05	6E-09	5.44E-05	2E-05	6E-09	2E-05
Naphthalene	5.74E-03	0.003	0.000034	2.36E-03	8E-05	5.51E-03	2E+00	8E-05	2E+00
Xylenes	1.80E-03	0.1	NA	NA	NA	1.73E-03	2E-02	NA	2E-02
Tetrachloroethene	5.67E-02	0.27	0.0000059	2.33E-02	1E-04	5.43E-02	2E-01	1E-04	2E-01
Toluene	3.50E-03	5	NA	NA	NA	3.36E-03	7E-04	NA	7E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	3.81E-04	NA	0.000002	1.57E-04	3E-07	NA	NA	3E-07	NA
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					2E-04		2E+00	2E-04	2E+00

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker or Storage User - Long Term - Bathroom

Indoor Air

Volatilization from Indoor Air

Bathroom

Sample Location IA-14

Receptor:	Commercial/Industrial Worker or Storage User
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Bathroom
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	1	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	2.07E-04	5	NA	NA	NA	5.91E-06	1E-06	NA	1E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	4.13E-07	7E-10	NA	NA	7E-10	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	1.13E-06	6E-06	NA	6E-06
1,2,4-Trimethylbenzene	9.21E-04	0.007	NA	NA	NA	2.63E-05	4E-03	NA	4E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.70E-04	2.4	0.000026	3.77E-06	1E-07	1.06E-05	4E-06	1E-07	4E-06
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.40E-05	0.002	0.00003	3.47E-07	1E-08	9.70E-07	5E-04	1E-08	5E-04
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.61E-03	0.8	0.000011	2.66E-05	3E-07	7.44E-05	9E-05	3E-07	9E-05
Benzene	8.19E-04	0.03	0.0000078	8.34E-06	7E-08	2.34E-05	8E-04	7E-08	8E-04
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.75E-04	0.1	0.000006	4.84E-06	3E-08	1.35E-05	1E-04	3E-08	1E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	2.98E-04	0.098	0.000023	3.03E-06	7E-08	8.49E-06	9E-05	7E-08	9E-05
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	1.13E-06	3E-05	NA	3E-05
Ethylbenzene	8.97E-04	1	0.000025	9.14E-06	2E-08	2.56E-05	3E-05	2E-08	3E-05
Methylene chloride	1.41E-03	1	0.0000047	1.43E-05	7E-09	4.01E-05	4E-05	7E-09	4E-05
Methyl tert butyl ether	1.44E-04	3	0.0000026	1.47E-06	4E-10	4.11E-06	1E-06	4E-10	1E-06
Naphthalene	1.67E-03	0.003	0.000034	1.70E-05	6E-07	4.77E-05	2E-02	6E-07	2E-02
Xylenes	3.20E-03	0.1	NA	NA	NA	9.12E-05	9E-04	NA	9E-04
Tetrachloroethene	1.72E-02	0.27	0.0000059	1.75E-04	1E-06	4.91E-04	2E-03	1E-06	2E-03
Toluene	5.78E-03	5	NA	NA	NA	1.65E-04	3E-05	NA	3E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.58E-05	NA	0.000002	8.74E-07	2E-09	NA	NA	2E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-06	2E-02	2E-06	2E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker or Storage User - Short Term - Bathroom

Indoor Air

Volatilization from Indoor Air

Bathroom

Sample Location IA-14

Receptor:	Commercial/Industrial Worker or Storage User
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Bathroom
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	1	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	2.07E-04	5	NA	NA	NA	5.91E-06	1E-06	NA	1E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	8.26E-08	1E-10	NA	NA	1E-10	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	1.13E-06	6E-06	NA	6E-06
1,2,4-Trimethylbenzene	9.21E-04	0.007	NA	NA	NA	2.63E-05	4E-03	NA	4E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.70E-04	2.4	0.000026	7.54E-07	2E-08	1.06E-05	4E-06	2E-08	4E-06
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.40E-05	0.002	0.00003	6.93E-08	2E-09	9.70E-07	5E-04	2E-09	5E-04
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.61E-03	0.8	0.000011	5.31E-06	6E-08	7.44E-05	9E-05	6E-08	9E-05
Benzene	8.19E-04	0.03	0.0000078	1.67E-06	1E-08	2.34E-05	8E-04	1E-08	8E-04
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.75E-04	0.1	0.000006	9.67E-07	6E-09	1.35E-05	1E-04	6E-09	1E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	2.98E-04	0.098	0.000023	6.06E-07	1E-08	8.49E-06	9E-05	1E-08	9E-05
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	1.13E-06	3E-05	NA	3E-05
Ethylbenzene	8.97E-04	1	0.000025	1.83E-06	5E-09	2.56E-05	3E-05	5E-09	3E-05
Methylene chloride	1.41E-03	1	0.0000047	2.86E-06	1E-09	4.01E-05	4E-05	1E-09	4E-05
Methyl tert butyl ether	1.44E-04	3	0.0000026	2.94E-07	8E-11	4.11E-06	1E-06	8E-11	1E-06
Naphthalene	1.67E-03	0.003	0.000034	3.41E-06	1E-07	4.77E-05	2E-02	1E-07	2E-02
Xylenes	3.20E-03	0.1	NA	NA	NA	9.12E-05	9E-04	NA	9E-04
Tetrachloroethene	1.72E-02	0.27	0.0000059	3.51E-05	2E-07	4.91E-04	2E-03	2E-07	2E-03
Toluene	5.78E-03	5	NA	NA	NA	1.65E-04	3E-05	NA	3E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.58E-05	NA	0.000002	1.75E-07	3E-10	NA	NA	3E-10	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					4E-07		2E-02	4E-07	2E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

Bathroom

Sample Location IA-14

Receptor:	Resident - Long Term	<input type="button" value="▼"/>
Medium of Origin:	Indoor Air	<input type="button" value="▼"/>
Exposure Medium:	Indoor Air	<input type="button" value="▼"/>
Exposure Area:	Bathroom	<input type="button" value="▼"/>
Depth:	NA	<input type="button" value="▼"/>
Duration:		<input type="button" value="▼"/>

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	2.07E-04	5	NA	NA	NA	1.98E-04	4E-05	NA	4E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.66E-05	3E-08	NA	NA	3E-08	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.79E-05	2E-04	NA	2E-04
1,2,4-Trimethylbenzene	9.21E-04	0.007	NA	NA	NA	8.83E-04	1E-01	NA	1E-01
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.70E-04	2.4	0.000026	1.52E-04	4E-06	3.55E-04	1E-04	4E-06	1E-04
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	3.40E-05	0.002	0.00003	1.40E-05	4E-07	3.26E-05	2E-02	4E-07	2E-02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.61E-03	0.8	0.000011	1.07E-03	1E-05	2.50E-03	3E-03	1E-05	3E-03
Benzene	8.19E-04	0.03	0.0000078	3.36E-04	3E-06	7.85E-04	3E-02	3E-06	3E-02
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.75E-04	0.1	0.000006	1.95E-04	1E-06	4.55E-04	5E-03	1E-06	5E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	2.98E-04	0.098	0.000023	1.22E-04	3E-06	2.85E-04	3E-03	3E-06	3E-03
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.79E-05	1E-03	NA	1E-03
Ethylbenzene	8.97E-04	1	0.000025	3.69E-04	9E-07	8.60E-04	9E-04	9E-07	9E-04
Methylene chloride	1.41E-03	1	0.0000047	5.77E-04	3E-07	1.35E-03	1E-03	3E-07	1E-03
Methyl tert butyl ether	1.44E-04	3	0.00000026	5.92E-05	2E-08	1.38E-04	5E-05	2E-08	5E-05
Naphthalene	1.67E-03	0.003	0.000034	6.87E-04	2E-05	1.60E-03	5E-01	2E-05	5E-01
Xylenes	3.20E-03	0.1	NA	NA	NA	3.06E-03	3E-02	NA	3E-02
Tetrachloroethene	1.72E-02	0.27	0.0000059	7.07E-03	4E-05	1.65E-02	6E-02	4E-05	6E-02
Toluene	5.78E-03	5	NA	NA	NA	5.54E-03	1E-03	NA	1E-03
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	8.58E-05	NA	0.000002	3.52E-05	7E-08	NA	NA	7E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						9E-05	8E-01	9E-05	8E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Long Term - Pump Room

Indoor Air

Volatilization from Indoor Air

Pump Room

Sample Location IA-15

Receptor:	Commercial/Industrial Worker - Long
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Pump Room
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	0.5714286	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	2.19E-03	5	NA	NA	NA	3.56E-05	7E-06	NA	7E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	7.99E-04	NA	0.0000016	4.65E-06	7E-09	NA	NA	7E-09	NA
1,1-Dichloroethene	1.55E-04	0.2	NA	NA	NA	2.52E-06	1E-05	NA	1E-05
1,2,4-Trimethylbenzene	2.29E-04	0.007	NA	NA	NA	3.73E-06	5E-04	NA	5E-04
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1.01E-04	2.4	0.000026	5.88E-07	2E-08	1.65E-06	7E-07	2E-08	7E-07
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.75E-05	0.002	0.00003	2.77E-07	8E-09	7.75E-07	4E-04	8E-09	4E-04
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.28E-04	0.8	0.000011	1.33E-06	1E-08	3.72E-06	5E-06	1E-08	5E-06
Benzene	5.91E-04	0.03	0.0000078	3.44E-06	3E-08	9.63E-06	3E-04	3E-08	3E-04
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.50E-04	0.1	0.000006	2.62E-06	2E-08	7.33E-06	7E-05	2E-08	7E-05
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	2.61E-04	0.098	0.000023	1.52E-06	3E-08	4.26E-06	4E-05	3E-08	4E-05
cis-1,2-Dichloroethene	9.60E-04	0.035	NA	NA	NA	1.57E-05	4E-04	NA	4E-04
Ethylbenzene	6.79E-04	1	0.000025	3.95E-06	1E-08	1.11E-05	1E-05	1E-08	1E-05
Methylene chloride	8.70E-04	1	0.0000047	5.07E-06	2E-09	1.42E-05	1E-05	2E-09	1E-05
Methyl tert butyl ether	5.40E-05	3	0.0000026	3.15E-07	8E-11	8.81E-07	3E-07	8E-11	3E-07
Naphthalene	3.16E-04	0.003	0.000034	1.84E-06	6E-08	5.15E-06	2E-03	6E-08	2E-03
Xylenes	2.42E-03	0.1	NA	NA	NA	3.94E-05	4E-04	NA	4E-04
Tetrachloroethene	2.60E-02	0.27	0.0000059	1.51E-04	9E-07	4.23E-04	2E-03	9E-07	2E-03
Toluene	3.45E-03	5	NA	NA	NA	5.62E-05	1E-05	NA	1E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	3.58E-04	NA	0.000002	2.08E-06	4E-09	NA	NA	4E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						1E-06	6E-03	1E-06	6E-03

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Short Term - Pump Room

Indoor Air

Volatilization from Indoor Air

Pump Room

Sample Location IA-15

Receptor:	Commercial/Industrial Worker - Short
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Pump Room
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	0.5714286	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	2.19E-03	5	NA	NA	NA	3.56E-05	7E-06	NA	7E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	7.99E-04	NA	0.0000016	9.30E-07	1E-09	NA	NA	1E-09	NA
1,1-Dichloroethene	1.55E-04	0.2	NA	NA	NA	2.52E-06	1E-05	NA	1E-05
1,2,4-Trimethylbenzene	2.29E-04	0.007	NA	NA	NA	3.73E-06	5E-04	NA	5E-04
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1.01E-04	2.4	0.000026	1.18E-07	3E-09	1.65E-06	7E-07	3E-09	7E-07
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.75E-05	0.002	0.00003	5.53E-08	2E-09	7.75E-07	4E-04	2E-09	4E-04
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.28E-04	0.8	0.000011	2.66E-07	3E-09	3.72E-06	5E-06	3E-09	5E-06
Benzene	5.91E-04	0.03	0.0000078	6.88E-07	5E-09	9.63E-06	3E-04	5E-09	3E-04
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.50E-04	0.1	0.000006	5.24E-07	3E-09	7.33E-06	7E-05	3E-09	7E-05
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	2.61E-04	0.098	0.000023	3.04E-07	7E-09	4.26E-06	4E-05	7E-09	4E-05
cis-1,2-Dichloroethene	9.60E-04	0.035	NA	NA	NA	1.57E-05	4E-04	NA	4E-04
Ethylbenzene	6.79E-04	1	0.000025	7.91E-07	2E-09	1.11E-05	1E-05	2E-09	1E-05
Methylene chloride	8.70E-04	1	0.0000047	1.01E-06	5E-10	1.42E-05	1E-05	5E-10	1E-05
Methyl tert butyl ether	5.40E-05	3	0.0000026	6.29E-08	2E-11	8.81E-07	3E-07	2E-11	3E-07
Naphthalene	3.16E-04	0.003	0.000034	3.68E-07	1E-08	5.15E-06	2E-03	1E-08	2E-03
Xylenes	2.42E-03	0.1	NA	NA	NA	3.94E-05	4E-04	NA	4E-04
Tetrachloroethene	2.60E-02	0.27	0.0000059	3.02E-05	2E-07	4.23E-04	2E-03	2E-07	2E-03
Toluene	3.45E-03	5	NA	NA	NA	5.62E-05	1E-05	NA	1E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	3.58E-04	NA	0.000002	4.16E-07	8E-10	NA	NA	8E-10	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					2E-07		6E-03	2E-07	6E-03

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

Pump Room

Sample Location IA-15

Receptor:	Resident - Long Term	<input type="button" value="▼"/>
Medium of Origin:	Indoor Air	<input type="button" value="▼"/>
Exposure Medium:	Indoor Air	<input type="button" value="▼"/>
Exposure Area:	Pump Room	<input type="button" value="▼"/>
Depth:	NA	<input type="button" value="▼"/>
Duration:		<input type="button" value="▼"/>

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	2.19E-03	5	NA	NA	NA	2.10E-03	4E-04	NA	4E-04
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	7.99E-04	NA	0.0000016	3.28E-04	5E-07	NA	NA	5E-07	NA
1,1-Dichloroethene	1.55E-04	0.2	NA	NA	NA	1.48E-04	7E-04	NA	7E-04
1,2,4-Trimethylbenzene	2.29E-04	0.007	NA	NA	NA	2.19E-04	3E-02	NA	3E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	1.01E-04	2.4	0.000026	4.15E-05	1E-06	9.68E-05	4E-05	1E-06	4E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.75E-05	0.002	0.00003	1.95E-05	6E-07	4.55E-05	2E-02	6E-07	2E-02
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.28E-04	0.8	0.000011	9.37E-05	1E-06	2.19E-04	3E-04	1E-06	3E-04
Benzene	5.91E-04	0.03	0.0000078	2.43E-04	2E-06	5.66E-04	2E-02	2E-06	2E-02
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.50E-04	0.1	0.000006	1.85E-04	1E-06	4.31E-04	4E-03	1E-06	4E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	2.61E-04	0.098	0.000023	1.07E-04	2E-06	2.50E-04	3E-03	2E-06	3E-03
cis-1,2-Dichloroethene	9.60E-04	0.035	NA	NA	NA	9.21E-04	3E-02	NA	3E-02
Ethylbenzene	6.79E-04	1	0.000025	2.79E-04	7E-07	6.51E-04	7E-04	7E-07	7E-04
Methylene chloride	8.70E-04	1	0.0000047	3.58E-04	2E-07	8.34E-04	8E-04	2E-07	8E-04
Methyl tert butyl ether	5.40E-05	3	0.0000026	2.22E-05	6E-09	5.18E-05	2E-05	6E-09	2E-05
Naphthalene	3.16E-04	0.003	0.000034	1.30E-04	4E-06	3.03E-04	1E-01	4E-06	1E-01
Xylenes	2.42E-03	0.1	NA	NA	NA	2.32E-03	2E-02	NA	2E-02
Tetrachloroethene	2.60E-02	0.27	0.0000059	1.07E-02	6E-05	2.49E-02	9E-02	6E-05	9E-02
Toluene	3.45E-03	5	NA	NA	NA	3.30E-03	7E-04	NA	7E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	3.58E-04	NA	0.000002	1.47E-04	3E-07	NA	NA	3E-07	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						8E-05	3E-01	8E-05	3E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Long Term - Warehouse

Indoor Air

Volatilization from Indoor Air

East Side of Building

NA

Receptor:	Storage User - Long Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	East Side of Building
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.24E-04	5	NA	NA	NA	3.63E-05	7E-06	NA	7E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	6.20E-05	NA	0.0000016	1.89E-06	3E-09	NA	NA	3E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	7.14E-04	0.007	NA	NA	NA	6.11E-05	9E-03	NA	9E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.90E-04	2.4	0.000026	1.19E-05	3E-07	3.34E-05	1E-05	3E-07	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.92E-05	0.002	0.00003	1.50E-06	5E-08	4.21E-06	2E-03	5E-08	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.32E-03	0.8	0.000011	7.11E-05	8E-07	1.99E-04	2E-04	8E-07	2E-04
Benzene	8.04E-04	0.03	0.0000078	2.46E-05	2E-07	6.88E-05	2E-03	2E-07	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.60E-04	0.1	0.000006	1.41E-05	8E-08	3.94E-05	4E-04	8E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.36E-04	0.098	0.000023	4.14E-06	1E-07	1.16E-05	1E-04	1E-07	1E-04
cis-1,2-Dichloroethene	1.20E-04	0.035	NA	NA	NA	1.03E-05	3E-04	NA	3E-04
Ethylbenzene	6.45E-04	1	0.000025	1.97E-05	5E-08	5.52E-05	6E-05	5E-08	6E-05
Methylene chloride	1.23E-03	1	0.0000047	3.76E-05	2E-08	1.05E-04	1E-04	2E-08	1E-04
Methyl tert butyl ether	1.16E-04	3	0.0000026	3.56E-06	9E-10	9.96E-06	3E-06	9E-10	3E-06
Naphthalene	2.27E-03	0.003	0.000034	6.95E-05	2E-06	1.94E-04	6E-02	2E-06	6E-02
Xylenes	2.35E-03	0.1	NA	NA	NA	2.01E-04	2E-03	NA	2E-03
Tetrachloroethene	3.30E-02	0.27	0.0000059	1.01E-03	6E-06	2.83E-03	1E-02	6E-06	1E-02
Toluene	5.62E-03	5	NA	NA	NA	4.81E-04	1E-04	NA	1E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	2.34E-04	NA	0.000002	7.16E-06	1E-08	NA	NA	1E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					1E-05		9E-02	1E-05	9E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Short Term - Warehouse

Indoor Air

Volatilization from Indoor Air

East Side of Building

NA

Receptor:	Storage User - Short Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	East Side of Building
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.24E-04	5	NA	NA	NA	3.63E-05	7E-06	NA	7E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	6.20E-05	NA	0.0000016	3.79E-07	6E-10	NA	NA	6E-10	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	7.14E-04	0.007	NA	NA	NA	6.11E-05	9E-03	NA	9E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.90E-04	2.4	0.000026	2.39E-06	6E-08	3.34E-05	1E-05	6E-08	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.92E-05	0.002	0.00003	3.01E-07	9E-09	4.21E-06	2E-03	9E-09	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.32E-03	0.8	0.000011	1.42E-05	2E-07	1.99E-04	2E-04	2E-07	2E-04
Benzene	8.04E-04	0.03	0.0000078	4.92E-06	4E-08	6.88E-05	2E-03	4E-08	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.60E-04	0.1	0.000006	2.81E-06	2E-08	3.94E-05	4E-04	2E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.36E-04	0.098	0.000023	8.29E-07	2E-08	1.16E-05	1E-04	2E-08	1E-04
cis-1,2-Dichloroethene	1.20E-04	0.035	NA	NA	NA	1.03E-05	3E-04	NA	3E-04
Ethylbenzene	6.45E-04	1	0.000025	3.95E-06	1E-08	5.52E-05	6E-05	1E-08	6E-05
Methylene chloride	1.23E-03	1	0.0000047	7.53E-06	4E-09	1.05E-04	1E-04	4E-09	1E-04
Methyl tert butyl ether	1.16E-04	3	0.0000026	7.11E-07	2E-10	9.96E-06	3E-06	2E-10	3E-06
Naphthalene	2.27E-03	0.003	0.000034	1.39E-05	5E-07	1.94E-04	6E-02	5E-07	6E-02
Xylenes	2.35E-03	0.1	NA	NA	NA	2.01E-04	2E-03	NA	2E-03
Tetrachloroethene	3.30E-02	0.27	0.0000059	2.02E-04	1E-06	2.83E-03	1E-02	1E-06	1E-02
Toluene	5.62E-03	5	NA	NA	NA	4.81E-04	1E-04	NA	1E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	2.34E-04	NA	0.000002	1.43E-06	3E-09	NA	NA	3E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-06	9E-02	2E-06	9E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Long Term

Indoor Air

Volatilization from Indoor Air

East Side of Building

NA

Receptor:	Commercial/Industrial Worker - Long
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	East Side of Building
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.24E-04	5	NA	NA	NA	9.69E-05	2E-05	NA	2E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	6.20E-05	NA	0.0000016	5.05E-06	8E-09	NA	NA	8E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	7.14E-04	0.007	NA	NA	NA	1.63E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.90E-04	2.4	0.000026	3.18E-05	8E-07	8.91E-05	4E-05	8E-07	4E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.92E-05	0.002	0.00003	4.01E-06	1E-07	1.12E-05	6E-03	1E-07	6E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.32E-03	0.8	0.000011	1.90E-04	2E-06	5.31E-04	7E-04	2E-06	7E-04
Benzene	8.04E-04	0.03	0.0000078	6.56E-05	5E-07	1.84E-04	6E-03	5E-07	6E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.60E-04	0.1	0.000006	3.75E-05	2E-07	1.05E-04	1E-03	2E-07	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.36E-04	0.098	0.000023	1.10E-05	3E-07	3.09E-05	3E-04	3E-07	3E-04
cis-1,2-Dichloroethene	1.20E-04	0.035	NA	NA	NA	2.74E-05	8E-04	NA	8E-04
Ethylbenzene	6.45E-04	1	0.000025	5.26E-05	1E-07	1.47E-04	1E-04	1E-07	1E-04
Methylene chloride	1.23E-03	1	0.0000047	1.00E-04	5E-08	2.81E-04	3E-04	5E-08	3E-04
Methyl tert butyl ether	1.16E-04	3	0.0000026	9.49E-06	2E-09	2.66E-05	9E-06	2E-09	9E-06
Naphthalene	2.27E-03	0.003	0.000034	1.85E-04	6E-06	5.19E-04	2E-01	6E-06	2E-01
Xylenes	2.35E-03	0.1	NA	NA	NA	5.37E-04	5E-03	NA	5E-03
Tetrachloroethene	3.30E-02	0.27	0.0000059	2.69E-03	2E-05	7.53E-03	3E-02	2E-05	3E-02
Toluene	5.62E-03	5	NA	NA	NA	1.28E-03	3E-04	NA	3E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	2.34E-04	NA	0.000002	1.91E-05	4E-08	NA	NA	4E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					3E-05		2E-01	3E-05	2E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Short Term

Indoor Air

Volatilization from Indoor Air

East Side of Building

NA

Receptor:	Commercial/Industrial Worker - Short
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	East Side of Building
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.24E-04	5	NA	NA	NA	9.69E-05	2E-05	NA	2E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	6.20E-05	NA	0.0000016	1.01E-06	2E-09	NA	NA	2E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	7.14E-04	0.007	NA	NA	NA	1.63E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.90E-04	2.4	0.000026	6.36E-06	2E-07	8.91E-05	4E-05	2E-07	4E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.92E-05	0.002	0.00003	8.03E-07	2E-08	1.12E-05	6E-03	2E-08	6E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	2.32E-03	0.8	0.000011	3.79E-05	4E-07	5.31E-04	7E-04	4E-07	7E-04
Benzene	8.04E-04	0.03	0.0000078	1.31E-05	1E-07	1.84E-04	6E-03	1E-07	6E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.60E-04	0.1	0.000006	7.50E-06	4E-08	1.05E-04	1E-03	4E-08	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.36E-04	0.098	0.000023	2.21E-06	5E-08	3.09E-05	3E-04	5E-08	3E-04
cis-1,2-Dichloroethene	1.20E-04	0.035	NA	NA	NA	2.74E-05	8E-04	NA	8E-04
Ethylbenzene	6.45E-04	1	0.0000025	1.05E-05	3E-08	1.47E-04	1E-04	3E-08	1E-04
Methylene chloride	1.23E-03	1	0.00000047	2.01E-05	9E-09	2.81E-04	3E-04	9E-09	3E-04
Methyl tert butyl ether	1.16E-04	3	0.00000026	1.90E-06	5E-10	2.66E-05	9E-06	5E-10	9E-06
Naphthalene	2.27E-03	0.003	0.000034	3.70E-05	1E-06	5.19E-04	2E-01	1E-06	2E-01
Xylenes	2.35E-03	0.1	NA	NA	NA	5.37E-04	5E-03	NA	5E-03
Tetrachloroethene	3.30E-02	0.27	0.0000059	5.38E-04	3E-06	7.53E-03	3E-02	3E-06	3E-02
Toluene	5.62E-03	5	NA	NA	NA	1.28E-03	3E-04	NA	3E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	2.34E-04	NA	0.000002	3.82E-06	8E-09	NA	NA	8E-09	NA
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						5E-06	2E-01	5E-06	2E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

East Side of Building

NA

Receptor:	Resident - Long Term	<input type="button" value="▼"/>
Medium of Origin:	Indoor Air	<input type="button" value="▼"/>
Exposure Medium:	Indoor Air	<input type="button" value="▼"/>
Exposure Area:	East Side of Building	<input type="button" value="▼"/>
Depth:	NA	<input type="button" value="▼"/>
Duration:		<input type="button" value="▼"/>

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC		URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)	Risk Percent	HI Percent
	Indoor Air (mg/m3)	RfC (mg/m3)									
1,1,1-Trichloroethane	4.24E-04	5	NA	NA	4.07E-04	8E-05	NA	8E-05	NA	0%	0%
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND	NA	NA
1,1-Dichlorethane	6.20E-05	NA	0.0000016	2.55E-05	4E-08	NA	NA	4E-08	NA	0%	0%
1,1-Dichlorethene	3.95E-05	0.2	NA	NA	NA	3.79E-05	2E-04	NA	2E-04	NA	0%
1,2,4-Trimethylbenzene	7.14E-04	0.007	NA	NA	NA	6.84E-04	1E-01	NA	1E-01	NA	10%
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND	NA	NA
1,2-Dichloroethane	3.90E-04	2.4	0.000026	1.60E-04	4E-06	3.74E-04	2E-04	4E-06	2E-04	3%	0%
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND	NA	NA
1,3-Butadiene	4.92E-05	0.002	0.00003	2.02E-05	6E-07	4.72E-05	2E-02	6E-07	2E-02	0%	2%
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND	NA	NA
1,4-Dichlorobenzene	2.32E-03	0.8	0.000011	9.55E-04	1E-05	2.23E-03	3E-03	1E-05	3E-03	8%	0%
Benzene	8.04E-04	0.03	0.000078	3.30E-04	3E-06	7.71E-04	3E-02	3E-06	3E-02	2%	2%
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND	NA	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND	NA	NA
Carbon tetrachloride	4.60E-04	0.1	0.000006	1.89E-04	1E-06	4.41E-04	4E-03	1E-06	4E-03	1%	0%
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND	NA	NA
Chloroform	1.36E-04	0.098	0.000023	5.57E-05	1E-06	1.30E-04	1E-03	1E-06	1E-03	1%	0%
cis-1,2-Dichloroethene	1.20E-04	0.035	NA	NA	NA	1.15E-04	3E-03	NA	3E-03	NA	0%
Ethylbenzene	6.45E-04	1	0.000025	2.65E-04	7E-07	6.19E-04	6E-04	7E-07	6E-04	0%	0%
Methylene chloride	1.23E-03	1	0.0000047	5.06E-04	2E-07	1.18E-03	1E-03	2E-07	1E-03	0%	0%
Methyl tert butyl ether	1.16E-04	3	0.00000026	4.78E-05	1E-08	1.12E-04	4E-05	1E-08	4E-05	0%	0%
Naphthalene	2.27E-03	0.003	0.000034	9.34E-04	3E-05	2.18E-03	7E-01	3E-05	7E-01	24%	71%
Xylenes	2.35E-03	0.1	NA	NA	NA	2.25E-03	2E-02	NA	2E-02	NA	2%
Tetrachloroethene	3.30E-02	0.27	0.0000059	1.36E-02	8E-05	3.16E-02	1E-01	8E-05	1E-01	60%	11%
Toluene	5.62E-03	5	NA	NA	NA	5.39E-03	1E-03	NA	1E-03	NA	0%
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND	NA	NA
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND	NA	NA
Trichloroethene	2.34E-04	NA	0.000002	9.62E-05	2E-07	NA	NA	2E-07	NA	0%	NA
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND	NA	NA
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND	NA	NA
Total					1E-04		1E+00	1E-04	1E+00	100%	100%

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Long Term - Warehouse

Indoor Air

Volatilization from Indoor Air

West Side of Building

NA

Receptor:	Storage User - Long Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	West Side of Building
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.51E-04	5	NA	NA	NA	1.29E-05	3E-06	NA	3E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	1.24E-06	2E-09	NA	NA	2E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	6.33E-04	0.007	NA	NA	NA	5.42E-05	8E-03	NA	8E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.45E-04	2.4	0.000026	1.05E-05	3E-07	2.95E-05	1E-05	3E-07	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.54E-05	0.002	0.00003	1.39E-06	4E-08	3.88E-06	2E-03	4E-08	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.23E-02	0.8	0.000011	3.76E-04	4E-06	1.05E-03	1E-03	4E-06	1E-03
Benzene	7.77E-04	0.03	0.0000078	2.38E-05	2E-07	6.65E-05	2E-03	2E-07	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.62E-04	0.1	0.000006	1.41E-05	8E-08	3.95E-05	4E-04	8E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.31E-04	0.098	0.000023	3.99E-06	9E-08	1.12E-05	1E-04	9E-08	1E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.38E-06	1E-04	NA	1E-04
Ethylbenzene	5.88E-04	1	0.000025	1.80E-05	4E-08	5.04E-05	5E-05	4E-08	5E-05
Methylene chloride	2.19E-03	1	0.0000047	6.69E-05	3E-08	1.87E-04	2E-04	3E-08	2E-04
Methyl tert butyl ether	3.07E-04	3	0.0000026	9.38E-06	2E-09	2.63E-05	9E-06	2E-09	9E-06
Naphthalene	1.10E-03	0.003	0.000034	3.37E-05	1E-06	9.43E-05	3E-02	1E-06	3E-02
Xylenes	2.05E-03	0.1	NA	NA	NA	1.75E-04	2E-03	NA	2E-03
Tetrachloroethene	3.70E-03	0.27	0.0000059	1.13E-04	7E-07	3.17E-04	1E-03	7E-07	1E-03
Toluene	4.45E-03	5	NA	NA	NA	3.81E-04	8E-05	NA	8E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	6.84E-05	NA	0.000002	2.09E-06	4E-09	NA	NA	4E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					7E-06		5E-02	7E-06	5E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Short Term - Warehouse

Indoor Air

Volatilization from Indoor Air

West Side of Building

NA

Receptor:	Storage User - Short Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	West Side of Building
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.51E-04	5	NA	NA	NA	1.29E-05	3E-06	NA	3E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	2.48E-07	4E-10	NA	NA	4E-10	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	3.38E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	6.33E-04	0.007	NA	NA	NA	5.42E-05	8E-03	NA	8E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.45E-04	2.4	0.000026	2.11E-06	5E-08	2.95E-05	1E-05	5E-08	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.54E-05	0.002	0.00003	2.77E-07	8E-09	3.88E-06	2E-03	8E-09	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.23E-02	0.8	0.000011	7.51E-05	8E-07	1.05E-03	1E-03	8E-07	1E-03
Benzene	7.77E-04	0.03	0.0000078	4.75E-06	4E-08	6.65E-05	2E-03	4E-08	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.62E-04	0.1	0.000006	2.82E-06	2E-08	3.95E-05	4E-04	2E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.31E-04	0.098	0.000023	7.99E-07	2E-08	1.12E-05	1E-04	2E-08	1E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.38E-06	1E-04	NA	1E-04
Ethylbenzene	5.88E-04	1	0.000025	3.60E-06	9E-09	5.04E-05	5E-05	9E-09	5E-05
Methylene chloride	2.19E-03	1	0.0000047	1.34E-05	6E-09	1.87E-04	2E-04	6E-09	2E-04
Methyl tert butyl ether	3.07E-04	3	0.0000026	1.88E-06	5E-10	2.63E-05	9E-06	5E-10	9E-06
Naphthalene	1.10E-03	0.003	0.000034	6.73E-06	2E-07	9.43E-05	3E-02	2E-07	3E-02
Xylenes	2.05E-03	0.1	NA	NA	NA	1.75E-04	2E-03	NA	2E-03
Tetrachloroethene	3.70E-03	0.27	0.0000059	2.26E-05	1E-07	3.17E-04	1E-03	1E-07	1E-03
Toluene	4.45E-03	5	NA	NA	NA	3.81E-04	8E-05	NA	8E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	6.84E-05	NA	0.000002	4.18E-07	8E-10	NA	NA	8E-10	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						1E-06	5E-02	1E-06	5E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Long Term

Indoor Air

Volatilization from Indoor Air

West Side of Building

NA

Receptor:	Commercial/Industrial Worker - Long
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	West Side of Building
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.51E-04	5	NA	NA	NA	3.44E-05	7E-06	NA	7E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	3.30E-06	5E-09	NA	NA	5E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	6.33E-04	0.007	NA	NA	NA	1.45E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.45E-04	2.4	0.000026	2.81E-05	7E-07	7.87E-05	3E-05	7E-07	3E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.54E-05	0.002	0.00003	3.70E-06	1E-07	1.04E-05	5E-03	1E-07	5E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.23E-02	0.8	0.000011	1.00E-03	1E-05	2.80E-03	4E-03	1E-05	4E-03
Benzene	7.77E-04	0.03	0.0000078	6.34E-05	5E-07	1.77E-04	6E-03	5E-07	6E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.62E-04	0.1	0.000006	3.77E-05	2E-07	1.05E-04	1E-03	2E-07	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.31E-04	0.098	0.000023	1.07E-05	2E-07	2.98E-05	3E-04	2E-07	3E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	9.02E-06	3E-04	NA	3E-04
Ethylbenzene	5.88E-04	1	0.000025	4.80E-05	1E-07	1.34E-04	1E-04	1E-07	1E-04
Methylene chloride	2.19E-03	1	0.0000047	1.78E-04	8E-08	5.00E-04	5E-04	8E-08	5E-04
Methyl tert butyl ether	3.07E-04	3	0.0000026	2.50E-05	7E-09	7.00E-05	2E-05	7E-09	2E-05
Naphthalene	1.10E-03	0.003	0.000034	8.98E-05	3E-06	2.51E-04	8E-02	3E-06	8E-02
Xylenes	2.05E-03	0.1	NA	NA	NA	4.68E-04	5E-03	NA	5E-03
Tetrachloroethene	3.70E-03	0.27	0.0000059	3.02E-04	2E-06	8.44E-04	3E-03	2E-06	3E-03
Toluene	4.45E-03	5	NA	NA	NA	1.02E-03	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	6.84E-05	NA	0.000002	5.58E-06	1E-08	NA	NA	1E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-05	1E-01	2E-05	1E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Short Term

Indoor Air

Volatilization from Indoor Air

West Side of Building

NA

Receptor:	Commercial/Industrial Worker - Short
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	West Side of Building
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	1.51E-04	5	NA	NA	NA	3.44E-05	7E-06	NA	7E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	4.05E-05	NA	0.0000016	6.60E-07	1E-09	NA	NA	1E-09	NA
1,1-Dichloroethene	3.95E-05	0.2	NA	NA	NA	9.02E-06	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	6.33E-04	0.007	NA	NA	NA	1.45E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.45E-04	2.4	0.000026	5.62E-06	1E-07	7.87E-05	3E-05	1E-07	3E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.54E-05	0.002	0.00003	7.40E-07	2E-08	1.04E-05	5E-03	2E-08	5E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	1.23E-02	0.8	0.000011	2.00E-04	2E-06	2.80E-03	4E-03	2E-06	4E-03
Benzene	7.77E-04	0.03	0.0000078	1.27E-05	1E-07	1.77E-04	6E-03	1E-07	6E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.62E-04	0.1	0.000006	7.53E-06	5E-08	1.05E-04	1E-03	5E-08	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.31E-04	0.098	0.000023	2.13E-06	5E-08	2.98E-05	3E-04	5E-08	3E-04
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	9.02E-06	3E-04	NA	3E-04
Ethylbenzene	5.88E-04	1	0.000025	9.59E-06	2E-08	1.34E-04	1E-04	2E-08	1E-04
Methylene chloride	2.19E-03	1	0.0000047	3.57E-05	2E-08	5.00E-04	5E-04	2E-08	5E-04
Methyl tert butyl ether	3.07E-04	3	0.0000026	5.00E-06	1E-09	7.00E-05	2E-05	1E-09	2E-05
Naphthalene	1.10E-03	0.003	0.000034	1.80E-05	6E-07	2.51E-04	8E-02	6E-07	8E-02
Xylenes	2.05E-03	0.1	NA	NA	NA	4.68E-04	5E-03	NA	5E-03
Tetrachloroethene	3.70E-03	0.27	0.0000059	6.03E-05	4E-07	8.44E-04	3E-03	4E-07	3E-03
Toluene	4.45E-03	5	NA	NA	NA	1.02E-03	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	6.84E-05	NA	0.000002	1.12E-06	2E-09	NA	NA	2E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						4E-06	1E-01	4E-06	1E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

West Side of Building

NA

Receptor:	Resident - Long Term	<input type="button" value="▼"/>
Medium of Origin:	Indoor Air	<input type="button" value="▼"/>
Exposure Medium:	Indoor Air	<input type="button" value="▼"/>
Exposure Area:	West Side of Building	<input type="button" value="▼"/>
Depth:	NA	<input type="button" value="▼"/>
Duration:		<input type="button" value="▼"/>

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
ICF	Conversion Factor	ug/mg	1000	

Compound	EPC		URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)	Risk Percent	HI Percent
	Indoor Air (mg/m3)	RfC (mg/m3)									
1,1,1-Trichloroethane	1.51E-04	5	NA	NA	1.44E-04	3E-05	NA	3E-05	NA	0%	0%
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND	NA	NA
1,1-Dichlorethane	4.05E-05	NA	0.0000016	1.66E-05	3E-08	NA	NA	3E-08	NA	0%	0%
1,1-Dichloorethane	3.95E-05	0.2	NA	NA	NA	3.79E-05	2E-04	NA	2E-04	NA	0%
1,2,4-Trimethylbenzene	6.33E-04	0.007	NA	NA	NA	6.07E-04	9E-02	NA	9E-02	NA	16%
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND	NA	NA
1,2-Dichloroethane	3.45E-04	2.4	0.000026	1.42E-04	4E-06	3.31E-04	1E-04	4E-06	1E-04	4%	0%
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND	NA	NA
1,3-Butadiene	4.54E-05	0.002	0.00003	1.86E-05	6E-07	4.35E-05	2E-02	6E-07	2E-02	1%	4%
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND	NA	NA
1,4-Dichlorobenzene	1.23E-02	0.8	0.000011	5.05E-03	6E-05	1.18E-02	1E-02	6E-05	1E-02	62%	3%
Benzene	7.77E-04	0.03	0.000078	3.19E-04	2E-06	7.45E-04	2E-02	2E-06	2E-02	3%	5%
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND	NA	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND	NA	NA
Carbon tetrachloride	4.62E-04	0.1	0.000006	1.90E-04	1E-06	4.43E-04	4E-03	1E-06	4E-03	1%	1%
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND	NA	NA
Chloroform	1.31E-04	0.098	0.000023	5.37E-05	1E-06	1.25E-04	1E-03	1E-06	1E-03	1%	0%
cis-1,2-Dichloroethene	3.95E-05	0.035	NA	NA	NA	3.79E-05	1E-03	NA	1E-03	NA	0%
Ethylbenzene	5.88E-04	1	0.000025	2.42E-04	6E-07	5.64E-04	6E-04	6E-07	6E-04	1%	0%
Methylene chloride	2.19E-03	1	0.0000047	8.99E-04	4E-07	2.10E-03	2E-03	4E-07	2E-03	0%	0%
Methyl tert butyl ether	3.07E-04	3	0.00000026	1.26E-04	3E-08	2.94E-04	1E-04	3E-08	1E-04	0%	0%
Naphthalene	1.10E-03	0.003	0.000034	4.53E-04	2E-05	1.06E-03	4E-01	2E-05	4E-01	17%	65%
Xylenes	2.05E-03	0.1	NA	NA	NA	1.96E-03	2E-02	NA	2E-02	NA	4%
Tetrachloroethene	3.70E-03	0.27	0.0000059	1.52E-03	9E-06	3.55E-03	1E-02	9E-06	1E-02	10%	2%
Toluene	4.45E-03	5	NA	NA	NA	4.27E-03	9E-04	NA	9E-04	NA	0%
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND	NA	NA
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND	NA	NA
Trichloroethene	6.84E-05	NA	0.000002	2.81E-05	6E-08	NA	NA	6E-08	NA	0%	NA
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND	NA	NA
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND	NA	NA
Total					9E-05		5E-01	9E-05	5E-01	100%	100%

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Long Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Entire Building

NA

Receptor:	Storage User - Long Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Entire Building
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.69E-04	5	NA	NA	NA	4.01E-05	8E-06	NA	8E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	1.05E-04	NA	0.0000016	3.22E-06	5E-09	NA	NA	5E-09	NA
1,1-Dichloroethene	4.72E-05	0.2	NA	NA	NA	4.04E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	6.60E-04	0.007	NA	NA	NA	5.65E-05	8E-03	NA	8E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.59E-04	2.4	0.000026	1.10E-05	3E-07	3.07E-05	1E-05	3E-07	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.81E-05	0.002	0.00003	1.47E-06	4E-08	4.12E-06	2E-03	4E-08	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	4.84E-03	0.8	0.000011	1.48E-04	2E-06	4.14E-04	5E-04	2E-06	5E-04
Benzene	7.83E-04	0.03	0.0000078	2.39E-05	2E-07	6.70E-05	2E-03	2E-07	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.60E-04	0.1	0.000006	1.41E-05	8E-08	3.94E-05	4E-04	8E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.43E-04	0.098	0.000023	4.36E-06	1E-07	1.22E-05	1E-04	1E-07	1E-04
cis-1,2-Dichloroethene	1.55E-04	0.035	NA	NA	NA	1.32E-05	4E-04	NA	4E-04
Ethylbenzene	6.32E-04	1	0.000025	1.93E-05	5E-08	5.41E-05	5E-05	5E-08	5E-05
Methylene chloride	1.46E-03	1	0.0000047	4.47E-05	2E-08	1.25E-04	1E-04	2E-08	1E-04
Methyl tert butyl ether	1.63E-04	3	0.0000026	4.98E-06	1E-09	1.39E-05	5E-06	1E-09	5E-06
Naphthalene	1.83E-03	0.003	0.000034	5.59E-05	2E-06	1.57E-04	5E-02	2E-06	5E-02
Xylenes	2.27E-03	0.1	NA	NA	NA	1.95E-04	2E-03	NA	2E-03
Tetrachloroethene	2.47E-02	0.27	0.0000059	7.56E-04	4E-06	2.12E-03	8E-03	4E-06	8E-03
Toluene	5.16E-03	5	NA	NA	NA	4.42E-04	9E-05	NA	9E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.98E-04	NA	0.000002	6.06E-06	1E-08	NA	NA	1E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total					9E-06		8E-02	9E-06	8E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Storage User - Short Term - Warehouse

Indoor Air

Volatilization from Indoor Air

Entire Building

NA

Receptor:	Storage User - Short Term - Warehouse
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Entire Building
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	3	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.69E-04	5	NA	NA	NA	4.01E-05	8E-06	NA	8E-06
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	1.05E-04	NA	0.0000016	6.44E-07	1E-09	NA	NA	1E-09	NA
1,1-Dichloroethene	4.72E-05	0.2	NA	NA	NA	4.04E-06	2E-05	NA	2E-05
1,2,4-Trimethylbenzene	6.60E-04	0.007	NA	NA	NA	5.65E-05	8E-03	NA	8E-03
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.59E-04	2.4	0.000026	2.19E-06	6E-08	3.07E-05	1E-05	6E-08	1E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.81E-05	0.002	0.00003	2.94E-07	9E-09	4.12E-06	2E-03	9E-09	2E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	4.84E-03	0.8	0.000011	2.96E-05	3E-07	4.14E-04	5E-04	3E-07	5E-04
Benzene	7.83E-04	0.03	0.0000078	4.79E-06	4E-08	6.70E-05	2E-03	4E-08	2E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.60E-04	0.1	0.000006	2.81E-06	2E-08	3.94E-05	4E-04	2E-08	4E-04
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.43E-04	0.098	0.000023	8.72E-07	2E-08	1.22E-05	1E-04	2E-08	1E-04
cis-1,2-Dichloroethene	1.55E-04	0.035	NA	NA	NA	1.32E-05	4E-04	NA	4E-04
Ethylbenzene	6.32E-04	1	0.000025	3.87E-06	1E-08	5.41E-05	5E-05	1E-08	5E-05
Methylene chloride	1.46E-03	1	0.0000047	8.94E-06	4E-09	1.25E-04	1E-04	4E-09	1E-04
Methyl tert butyl ether	1.63E-04	3	0.0000026	9.96E-07	3E-10	1.39E-05	5E-06	3E-10	5E-06
Naphthalene	1.83E-03	0.003	0.000034	1.12E-05	4E-07	1.57E-04	5E-02	4E-07	5E-02
Xylenes	2.27E-03	0.1	NA	NA	NA	1.95E-04	2E-03	NA	2E-03
Tetrachloroethene	2.47E-02	0.27	0.0000059	1.51E-04	9E-07	2.12E-03	8E-03	9E-07	8E-03
Toluene	5.16E-03	5	NA	NA	NA	4.42E-04	9E-05	NA	9E-05
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.98E-04	NA	0.000002	1.21E-06	2E-09	NA	NA	2E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-06	8E-02	2E-06	8E-02

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Long Term

Indoor Air

Volatilization from Indoor Air

Entire Building

NA

Receptor:	Commercial/Industrial Worker - Long
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Entire Building
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	25	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	219000	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.69E-04	5	NA	NA	NA	1.07E-04	2E-05	NA	2E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	1.05E-04	NA	0.0000016	8.59E-06	1E-08	NA	NA	1E-08	NA
1,1-Dichloroethene	4.72E-05	0.2	NA	NA	NA	1.08E-05	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	6.60E-04	0.007	NA	NA	NA	1.51E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.59E-04	2.4	0.000026	2.93E-05	8E-07	8.19E-05	3E-05	8E-07	3E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.81E-05	0.002	0.00003	3.92E-06	1E-07	1.10E-05	5E-03	1E-07	5E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	4.84E-03	0.8	0.000011	3.95E-04	4E-06	1.11E-03	1E-03	4E-06	1E-03
Benzene	7.83E-04	0.03	0.0000078	6.38E-05	5E-07	1.79E-04	6E-03	5E-07	6E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.60E-04	0.1	0.000006	3.75E-05	2E-07	1.05E-04	1E-03	2E-07	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.43E-04	0.098	0.000023	1.16E-05	3E-07	3.25E-05	3E-04	3E-07	3E-04
cis-1,2-Dichloroethene	1.55E-04	0.035	NA	NA	NA	3.53E-05	1E-03	NA	1E-03
Ethylbenzene	6.32E-04	1	0.000025	5.16E-05	1E-07	1.44E-04	1E-04	1E-07	1E-04
Methylene chloride	1.46E-03	1	0.0000047	1.19E-04	6E-08	3.34E-04	3E-04	6E-08	3E-04
Methyl tert butyl ether	1.63E-04	3	0.0000026	1.33E-05	3E-09	3.72E-05	1E-05	3E-09	1E-05
Naphthalene	1.83E-03	0.003	0.000034	1.49E-04	5E-06	4.18E-04	1E-01	5E-06	1E-01
Xylenes	2.27E-03	0.1	NA	NA	NA	5.19E-04	5E-03	NA	5E-03
Tetrachloroethene	2.47E-02	0.27	0.0000059	2.02E-03	1E-05	5.64E-03	2E-02	1E-05	2E-02
Toluene	5.16E-03	5	NA	NA	NA	1.18E-03	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.98E-04	NA	0.000002	1.62E-05	3E-08	NA	NA	3E-08	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						2E-05	2E-01	2E-05	2E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Commercial/Industrial Worker - Short Term

Indoor Air

Volatilization from Indoor Air

Entire Building

NA

Receptor:	Commercial/Industrial Worker - Short
Medium of Origin:	Indoor Air
Exposure Medium:	Indoor Air
Exposure Area:	Entire Building
Depth:	NA
Duration:	

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	8	
EF	Indoor Air Exposure Frequency	ds/y	250	
ED	Indoor Air Exposure Duration	y	5	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	43800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC Indoor Air (mg/m3)	RfC (mg/m3)	URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)
1,1,1-Trichloroethane	4.69E-04	5	NA	NA	NA	1.07E-04	2E-05	NA	2E-05
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	1.05E-04	NA	0.0000016	1.72E-06	3E-09	NA	NA	3E-09	NA
1,1-Dichloroethene	4.72E-05	0.2	NA	NA	NA	1.08E-05	5E-05	NA	5E-05
1,2,4-Trimethylbenzene	6.60E-04	0.007	NA	NA	NA	1.51E-04	2E-02	NA	2E-02
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	3.59E-04	2.4	0.000026	5.85E-06	2E-07	8.19E-05	3E-05	2E-07	3E-05
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND
1,3-Butadiene	4.81E-05	0.002	0.00003	7.84E-07	2E-08	1.10E-05	5E-03	2E-08	5E-03
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	4.84E-03	0.8	0.000011	7.89E-05	9E-07	1.11E-03	1E-03	9E-07	1E-03
Benzene	7.83E-04	0.03	0.0000078	1.28E-05	1E-07	1.79E-04	6E-03	1E-07	6E-03
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND
Bromoform	ND	NA	0.000011	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	4.60E-04	0.1	0.000006	7.50E-06	4E-08	1.05E-04	1E-03	4E-08	1E-03
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND
Chloroform	1.43E-04	0.098	0.000023	2.32E-06	5E-08	3.25E-05	3E-04	5E-08	3E-04
cis-1,2-Dichloroethene	1.55E-04	0.035	NA	NA	NA	3.53E-05	1E-03	NA	1E-03
Ethylbenzene	6.32E-04	1	0.000025	1.03E-05	3E-08	1.44E-04	1E-04	3E-08	1E-04
Methylene chloride	1.46E-03	1	0.0000047	2.39E-05	1E-08	3.34E-04	3E-04	1E-08	3E-04
Methyl tert butyl ether	1.63E-04	3	0.0000026	2.66E-06	7E-10	3.72E-05	1E-05	7E-10	1E-05
Naphthalene	1.83E-03	0.003	0.000034	2.98E-05	1E-06	4.18E-04	1E-01	1E-06	1E-01
Xylenes	2.27E-03	0.1	NA	NA	NA	5.19E-04	5E-03	NA	5E-03
Tetrachloroethene	2.47E-02	0.27	0.0000059	4.03E-04	2E-06	5.64E-03	2E-02	2E-06	2E-02
Toluene	5.16E-03	5	NA	NA	NA	1.18E-03	2E-04	NA	2E-04
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND
Trichloroethene	1.98E-04	NA	0.000002	3.23E-06	6E-09	NA	NA	6E-09	NA
Vinyl chloride	ND	0.1	0.000044	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND
Total						5E-06	2E-01	5E-06	2E-01

NA - Not available

NC - Not calculated

ND - Not detected

Table

Exposure and Risk Estimates Associated With Inhalation of Volatile Compounds in Air

UniFirst Corporation

15 Olympia Avenue, Woburn, MA

Resident - Long Term

Indoor Air

Volatilization from Indoor Air

Entire Building

NA

Receptor:	Resident - Long Term	<input type="button" value="▼"/>
Medium of Origin:	Indoor Air	<input type="button" value="▼"/>
Exposure Medium:	Indoor Air	<input type="button" value="▼"/>
Exposure Area:	Entire Building	<input type="button" value="▼"/>
Depth:	NA	<input type="button" value="▼"/>
Duration:		<input type="button" value="▼"/>

$$C_{air} = \frac{C_{source}}{AF}$$

$$EC_{inh} = \frac{C_{air} \times ET \times EF \times ED}{AT}$$

$$HI_{inh} = \frac{EC_{inh}}{RfC}$$

$$Risk = EC_{inh} \times URF \times CF$$

Parameter	Definition	Units	Value	Comment
ET	Indoor Air Exposure Time	hrs/d	24	
EF	Indoor Air Exposure Frequency	ds/y	350	
ED	Indoor Air Exposure Duration	y	30	
ATc	Indoor Air Averaging Time - Cancer	hrs	613200	
ATn	Indoor Air Averaging Time - Non-Cancer	hrs	262800	
CF	Conversion Factor	ug/mg	1000	

Compound	EPC		URF 1/(ug/m3)	ADE-c mg/m3	Riskinh	ADE-nc mg/m3	Hlinh	Risk (Indoor Air)	HI (Indoor Air)	Risk Percent	HI Percent
	Indoor Air (mg/m3)	RfC (mg/m3)									
1,1,1-Trichloroethane	4.69E-04	5	NA	NA	4.49E-04	9E-05	NA	9E-05	NA	0%	0%
1,1,2-Trichloroethane	ND	NA	0.000016	ND	ND	ND	ND	ND	ND	NA	NA
1,1-Dichlorethane	1.05E-04	NA	0.0000016	4.33E-05	7E-08	NA	NA	7E-08	NA	0%	0%
1,1-Dichlorethene	4.72E-05	0.2	NA	NA	NA	4.52E-05	2E-04	NA	2E-04	NA	0%
1,2,4-Trimethylbenzene	6.60E-04	0.007	NA	NA	NA	6.33E-04	9E-02	NA	9E-02	NA	11%
1,2-Dibromoethane	ND	0.009	0.0006	ND	ND	ND	ND	ND	ND	NA	NA
1,2-Dichloroethane	3.59E-04	2.4	0.000026	1.47E-04	4E-06	3.44E-04	1E-04	4E-06	1E-04	3%	0%
1,2-Dichloropropane	ND	0.004	0.00001	ND	ND	ND	ND	ND	ND	NA	NA
1,3-Butadiene	4.81E-05	0.002	0.00003	1.98E-05	6E-07	4.61E-05	2E-02	6E-07	2E-02	1%	3%
1,3-Dichlorobenzene	ND	0.2	NA	ND	ND	ND	ND	ND	ND	NA	NA
1,4-Dichlorobenzene	4.84E-03	0.8	0.000011	1.99E-03	2E-05	4.64E-03	6E-03	2E-05	6E-03	19%	1%
Benzene	7.83E-04	0.03	0.000078	3.22E-04	3E-06	7.51E-04	3E-02	3E-06	3E-02	2%	3%
Bromodichloromethane	ND	NA	0.000037	ND	ND	ND	ND	ND	ND	NA	NA
Bromoform	ND	NA	0.0000011	ND	ND	ND	ND	ND	ND	NA	NA
Carbon tetrachloride	4.60E-04	0.1	0.000006	1.89E-04	1E-06	4.41E-04	4E-03	1E-06	4E-03	1%	1%
Chlorobenzene	ND	0.05	NA	ND	ND	ND	ND	ND	ND	NA	NA
Chloroform	1.43E-04	0.098	0.000023	5.86E-05	1E-06	1.37E-04	1E-03	1E-06	1E-03	1%	0%
cis-1,2-Dichloroethene	1.55E-04	0.035	NA	NA	NA	1.48E-04	4E-03	NA	4E-03	NA	0%
Ethylbenzene	6.32E-04	1	0.0000025	2.60E-04	6E-07	6.06E-04	6E-04	6E-07	6E-04	1%	0%
Methylene chloride	1.46E-03	1	0.0000047	6.01E-04	3E-07	1.40E-03	1E-03	3E-07	1E-03	0%	0%
Methyl tert butyl ether	1.63E-04	3	0.00000026	6.70E-05	2E-08	1.56E-04	5E-05	2E-08	5E-05	0%	0%
Naphthalene	1.83E-03	0.003	0.000034	7.52E-04	3E-05	1.75E-03	6E-01	3E-05	6E-01	22%	69%
Xylenes	2.27E-03	0.1	NA	NA	NA	2.18E-03	2E-02	NA	2E-02	NA	3%
Tetrachloroethene	2.47E-02	0.27	0.0000059	1.02E-02	6E-05	2.37E-02	9E-02	6E-05	9E-02	51%	10%
Toluene	5.16E-03	5	NA	NA	NA	4.95E-03	1E-03	NA	1E-03	NA	0%
trans-1,2-Dichloroethene	ND	0.06	NA	ND	ND	ND	ND	ND	ND	NA	NA
trans-1,3-Dichloropropene	ND	0.02	0.000004	ND	ND	ND	ND	ND	ND	NA	NA
Trichloroethene	1.98E-04	NA	0.000002	8.14E-05	2E-07	NA	NA	2E-07	NA	0%	NA
Vinyl chloride	ND	0.1	0.0000044	ND	ND	ND	ND	ND	ND	NA	NA
Isopropylbenzene	ND	0.4	NA	ND	ND	ND	ND	ND	ND	NA	NA
Total					1E-04		9E-01	1E-04	9E-01	100%	100%

NA - Not available

NC - Not calculated

ND - Not detected